ABSTRACT

OF

The Proceedings of the Thirty-Fourth Annual Meeting of the Association of Life Insurance Medical Directors of America

PRINTED FOR PRIVATE CIRCULATION

VOL. X

NEW YORK
Gibb Bros. & Moran, Inc.
1924

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The Association of Life Insurance
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Compiled by the Editor of the Proceedings

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An Abstract of the Proceedings

OF THE

Association of Life Insurance Medical Directors of America

THIRTY-FOURTH ANNUAL MEETING

The Thirty-fourth Annual Meeting of the Association of Life Insurance Medical Directors of America was held in the Home Office of the Travelers Insurance Company, Hartford, Conn., on October 18th and 19th, 1923. President Frank L. Grosvenor in the chair.

The following members and delegates were present at some time during the sessions:

J. W. Abbott, C. D. Alton, J. W. Amesse, T. D. Archibald, H. A. Baker, A. W. Balch, W. B. Bartlett, J. T. J. Battle, W. W. Beckett, E. B. Bigelow, C. C. Birchard, W. F. Blackford, D. N. Blakely, C. T. Brown, W. H. Browne, T. W. Burrows, J. T. Cabaniss, L. D. Chapin, C. L. Christiernin, Henry Colt, E. A. Colton, G. E. Crawford, R. M. Daley, H. K.

Dillard, W. W. Dinsmore, P. G. Drake, O. M. Eakins, Z. H. Ellis, C. H. English, W. G. Exton, J. W. Fisher, S. W. Gadd, A. H. Gordon, R. J. Graves, L. C. Grau, A. H. Griswold, F. L. Grosvenor, G. C. Hall, J. B. Hall, W. F. Hamilton, Whitfield Harral, A. B. Hobbs, Ross Huston, H. S. Hutchison, W. G. Hutchinson, C. B. Irwin, W. A. Jaquith, B. Y. Jaudon, F. L. B. Jenney, A. E. Johann, A. S. Knight, W. W. Knight, J. M. Little, J. M. Livingston, R. L. Lounsberry, C. N. McCloud, C. B. McCulloch, T. F. McMahon, H. A. Martelle, O. F. Maxon, W. F. Milroy, William Muhlberg, J. R. Neal, George Parker, J. A. Patton, J. S. Phelps, C. B. Piper, J. E. Pollard, W. E. Porter, J. T. Priestley, W. A. Reiter, F. P. Righter, O. H. Rogers, F. W. Rolph, E. K. Root, R. L. Rowley, S. B. Scholz, J. M. Smith, Morton Snow, Marion Souchon, S. C. Stanton, H. F. Starr, J. B. Steele, G. S. Strathy, Carl Stutzman, F. L. Truitt, J. P. Turner, Euen Van Kleeck, W. R. Ward, W. H. E. Wehner, F. S. Weisse, F. L. Wells, C. F. S. Whitney, T. H. Willard, C. H. Willits, Gordon Wilson, M. C. Wilson, Glenn Wood, H. H. Young.

There were present also Dr. W. W. Graves, Dr. H. M. Frost, Dr. S. R. Benedict, Dr. O. H. Folin, Dr. F. B. Kingsbury, Dr. Louis I. Dublin, Dr. Frederick L. Hoffman, Dr. C. C. Beach, Dr. W. W. Wright and Dr. I. H. Prouty.

Total attendance at all sessions, 109.

On motion the roll-call was waived and the members were requested to register their names in the book provided for that purpose.

On motion the reading of the minutes of the Thirty-

third Annual Meeting held on November 2nd and 3rd, 1922, was waived.

The Secretary read the minutes of the meetings of the Executive Council of May 16th and October 17th, 1923. These minutes were approved as read.

The names of the following candidates recommended by the Executive Council for membership in the Association were presented:

Dr. Edward McPherson Armstrong, Medical Inspector, Mutual Life Insurance Company of New York.

Dr. Richard Lee Willis, Medical Inspector, Mutual Life Insurance Company of New York.

Dr. W. B. Aten, Medical Director, Security Mutual Life Insurance Company, of Binghamton, N. Y.

Dr. M. O. Austin, Medical Director, West Coast Life Insurance Company, of San Francisco, Cal.

Dr. G. Holbrook Barber, Assistant Medical Director, Manhattan Life Insurance Company, of New York, N. Y.

Dr. T. W. Burrows, Medical Director, Central Life Insurance Company of Illinois, of Ottawa, Ill.

Dr. Dudley Fulton, Medical Director, Occidental Life Insurance Company, of Los Angeles, Cal.

Dr. Donald W. Skeel, Assistant Medical Director, Occidental Life Insurance Company, of Los Angeles, Cal.

Dr. Charles R. Henry, Medical Director, State Life Insurance Company, of Indianapolis, Ind.

Dr. H. S. Hutchison, Assistant Medical Director, Canada Life Assurance Company, of Toronto, Ontario, Canada.

Dr. James T. Montgomery, Medical Director, Southland Life Insurance Company, of Dallas, Texas.

Dr. John S. Turner, Medical Director, Southland Life Insurance Company, of Dallas, Texas.

Dr. Harry S. Pearse, Assistant Medical Director, Equitable Life Assurance Society, of New York City, N. Y.

Dr. Charles E. Waits, Medical Director, Southern States Life Insurance Company, of Atlanta, Ga.

Dr. R. W. Mann, Associate Medical Referee, Imperial Assurance Company of Canada, Toronto, Ontario, Canada.

Dr. Lawrence C. Sykes, Assistant Medical Director, Northwestern Mutual Life Insurance Company, of Milwaukee, Wis.

Dr. H. A. Baker, Medical Director, Kansas City Life Insurance Company, Kansas City, Mo. (formerly a member of the Association when connected with the Pittsburgh Life & Trust Company, and membership now transferred to the Kansas City Life Insurance Company).

On motion by Dr. Porter, seconded by Dr. Jaquith, the Secretary was instructed to cast a ballot in favor of the election of each of these candidates. The Secretary announced the ballot so cast, and the candidates were declared elected to membership in the Association. The President appointed Dr. Porter and Dr. Eakins a Committee to introduce the newly elected members to the Association. Two of these members, Drs. Burrows and Baker, were present and were escorted into the room by the Committee and introduced to the Association.

The Secretary announced that the following-named gentlemen were delegates from the American Life Convention group:

Dr. John W. Abbott, Maryland Assurance Corporation, of Baltimore, Md.

Dr. W. F. Blackford, Commonwealth Life Insurance Company, of Louisville, Ky.

Dr. G. E. Crawford, Cedar Rapids Life Insurance Company, of Cedar Rapids, Iowa.

Dr. Robert J. Graves, United Life and Accident Insurance Company, of Concord, N. H.

Dr. M. M. Lairy, LaFayette Life Insurance Company, of Lafayette, Ind.

Dr. John R. Neal, Mutual Life of Illinois, of Springfield, Ill.

Dr. H. H. Young, George Washington Life Insurance Company, of Charleston, West Virginia. (Dr. Young is an alternate delegate, and attended the meeting in place of Dr. C. E. Schilling, of the Ohio State Life Insurance Company, of Columbus, Ohio, regular delegate, who could not be present.)

Dr. S. C. Stanton, Farmers National Life Insurance Company, of Chicago, Illinois.

Dr. Carl Stutsman, Merchants Life Insurance Company, of Des Moines, Iowa.

The assembled members of the Association were welcomed by President Butler of the Travelers Insurance Company, who expressed the hope that their meeting at Hartford would be a successful one and matters might so shape themselves that they would be able to meet in Hartford again in the not too distant future.

Dr. Frank L. Grosvenor, President of the Association, delivered the following address:

EXPERIENCE ON CERTAIN BORDER-LINE CLASSIFICATIONS.

By F. L. Grosvenor, M.D.

Medical Director, The Travelers Insurance Co.

There has been some discussion as to whether too much or too little time is allotted by the Association at its annual meeting to consideration of the insuring of substandard lives. This question becomes of less significance as the number of companies issuing substandard insurance increases.

A third class of risks, termed border-line, may be deemed of equal importance to companies doing either a strictly standard business or substandard as well, for the reason that either type of company must treat them analogously or interfere with its mortality as a whole in the case of a standard company or with the standard mortality of a company issuing on both plans. It unquestionably is advisable for the underwriters in the latter company to avoid placing in the substandard class border-line risks which would be accepted as standard were that company conducting its business on standard lines only.

During the course of the Medico-Actuarial Investigation there were incorporated on our Hollerith cards additional codes covering largely the minor impairments on cases which were issued standard, with the idea that if this experience were tabulated after a reasonable length of time is might be of assistance in handling border-line cases, particularly those in which there is more than one minor impairment and also those cases in which there are minor impairments in addition to major impairments requiring substandard action. The exposure in most of these classes in our experience is small and in others it appeared insufficient to justify investigation. The results in certain of these minor impairments are presented for what they may be worth.

In comparing this experience with prior experiences it should be borne in mind that the lower trend in general mortality may be a factor in some of the results shown.

Our investigation covered all regular insurance issued in 1902 and later and carried to the policy anniversary in 1922. It, therefore, excludes not only Group and Wholesale but also Reinsurance Acquired. It disregards Reinsurance Ceded. All substandard policies were excluded regardless of the cause and of the manner of rating except in the case of Tuberculosis in the Family History as explained later. This investigation was in general conducted under the same rules as applied to the Medico-Actuarial and American Men Investigations. In most such experiences policies have been considered terminated when they went on to Extended Term or Paid Up insurance because of non-payment of premiums or when they were changed to some other form of policy. As the experiece under insurance after the application of non-forfeiture provisions has not been entirely satisfactory, it seemed best in this experience to exclude such subsequent exposure in order to obtain a more complete analysis of the effects of the impairments.

The expected deaths in this entire experience are computed upon the American Men Table and analysis is, therefore, made by policy year on a Select Table. It is, of course, shown divided into age groups where they seem of possible significance.

As the detailed work would be almost interminable if each impairment investigated included every policy issued with that impairment, these impairments were investigated practically simultaneously so that in general it might be stated that all cases were included regardless of any other impairments present unless two impairments investigated are shown, in which case the policy is excluded from both impairments. There was no biased attempt to exclude any experience, and it is believed that these results would be unaffected at least in so far as the number of policies is concerned if every standard policy indicating these impairments had been used.

The select period covers the first five years and the ultimate includes all subsequent experience. In an analysis of the ex-

perience it should be borne in mind that the ratios during the select period and during the ultimate period are of more significance than the combined ratio because it is quite likely that our combined ratio is unduly affected by the large proportion of business within the select years.

All causes of death were obtained under each impairment, but as the experience is comparatively limited, only causes that appear to be closely connected with the impairment are mentioned in this paper. The expected deaths with which these are compared were computed upon the Cause of Death Table developed in the American Men experience.

Of course this experience includes epidemic influenza and war claims, but these are considered of little relative importance both because the amounts involved constitute a comparatively small proportion of the total and because special attention has been paid to these claims in each impairment investigated, and they have been found with few exceptions in the case of amounts to be of small importance. In any event it is safer to use experience including them than it would be to eliminate them in any way.

Most experiences of this nature are based upon either the number of lives or the number of policies involved, the latter being used to avoid the extra work needed in obtaining the former. The results are given and principally considered here by numbers of policies, but it was thought that the experience by amounts of insurance would be of interest and possibly in some cases of value. If these results were not unduly influenced by accidental fluctuation due to the small number of large policies involved, it seems that they would be more valuable than the experience by number of policies on insured lives with the given impairments. In the detailed analysis of these impairments all policies for $25,000 or more have been studied as to their effect upon the experience, but in this paper attention is called to this feature only where the effect of individual policies was very pronounced.

REMOVAL OF APPENDIX WITHIN 5 YEARS

Age at Entry	Exposure		Actual Deaths		Percentage of Actual to Expected	
	No.	Amount	No.	Amount	No.	Amount
			Select			
15-29	11,764	$29,363,000	50	$165,111	118.9%	157.5%
30-44	10,475	45,770,700	40	126,653	87.4	61.9
45	1,163	6,562,600	10	17,500	87.5	29.2
TOTAL	23,402	81,696,300	100	309,264	100.8	83.7
			Ultimate			
Attained Age						
20-34	2,466	5,171,700	13	21,000	117.5	90.3
35-49	3,418	11,470,500	19	82,500	86.1	104.7
50	522	3,404,000	10	236,806	113.6	436.0
TOTAL	6,406	20,046,200	42	340,306	100.1	217.7
			Total			
	29,808	101,742,500	142	649,570	100.6	123.6

REMOVAL OF APPENDIX MORE THAN 5 YEARS PREVIOUS

Age at Entry	Exposure		Actual Deaths		Percentage of Actual to Expected	
	No.	Amount	No.	Amount	No.	Amount
			Select			
15-29	7,474	$21,134,400	29	$73,000	108.6%	97.5%
30-44	12,897	64,960,000	40	312,085	71.2	108.8
45	2,275	15,406,100	10	29,000	46.1	20.7
TOTAL	22,646	101,500,500	79	414,085	75.6	82.5
			Ultimate			
Attained Age						
20-34	1,075	2,159,100	4	8,000	82.7	82.1
35-49	2,341	8,316,400	8	24,843	51.8	43.9
50	601	3,927,600	13	176,000	113.5	264.6
TOTAL	4,017	14,403,100	25	208,843	78.8	157.2
			Total			
	26,663	115,903,600	104	622,928	76.3	98.1

In cases showing a history within 10 years of an attack of appendicitis without operation, our experience of 85.8% by number and 75.2% by amount is too favorable to be given much weight as compared with the Medico-Actuarial Experience because our data is too limited, being based on 3,849 years of exposure for $9,595,000 with 17 deaths for $39,210. These included no deaths from appendicitis or typhilitis, but there were two for $1,500 due to biliary calculi and the largest for $14,710 was due to disease of the liver.

Our experience on cases having had removal of appendix within five years involving considerable exposure is not favorable by numbers, but is much worse by amounts. There were no claims due to appendicitis or typhilitis, but there were 22 for $101,500 due to diseases of the digestive system. The only claim over $30,000 was one for $200,000 involving three policies in the ninth policy year at attained age 52, due to myocarditis complicated with chronic nephritis and hypertension. This unfavorable experience calls to my mind the statement by Dr. Ross before the Association some years ago to the effect that he did not consider an applicant who had undergone a major abdominal operation as a first class risk.

Our experience involving considerable exposure where operation for appendicitis was more than five years previous to examination was favorable by number, but not so favorable by amount. It included no claims due to appendicitis and typhilitis, but 15 for $61,000 due to other diseases of the digestive system. The only claims for more than $25,000 were each for $100,000, one in the second policy year at age 43 due to suicide and one, in the ninth year at age 54 due to accident.

HERNIA OTHER THAN VENTRAL OR UMBILICAL WITH SUPPORT

Age at Entry	Exposure		Actual Deaths		Percentage of Actual to Expected	
	No.	Amount	No.	Amount	No.	Amount
			Select			
15-29	3,247	$6,675,400	4	$8,500	33.7%	35.1%
30-44	8,681	30,244,100	24	59,000	58.5	40.7
45	4,345	16,741,600	36	227,141	70.7	121.3
TOTAL	16,273	53,661,100	64	294,641	61.7	82.7
			Ultimate			
Attained Age						
20-34	922	1,654,900	5	8,500	120.3	113.9
35-49	3,396	9,414,900	21	40,561	86.5	57.6
50	2,876	10,280,900	45	170,102	66.3	76.3
TOTAL	7,194	21,350,700	71	219,163	73.7	72.8
			Total			
	23,467	75,011,800	135	513,804	67.5	78.2

In this group there are included practically inguinal hernias alone, which were easily reducible. The experience would seem to have been favorable and in marked contra-distinction to the Medico-Actuarial Experience, Vo. IV, page 25, which showed a mortality ration of 92% based on the Medico-Actuarial Table. The actual deaths due to hernia were about the same as the expected. The experience was 81.8% by number and 66.5% by amount on the corresponding class of hernia without support but this was on a total exposure of only 3,612 policies for $8,986,300 involving 17 deaths for $35,152.

GASTRO-INTESTINAL DISORDERS WITHIN 5 YEARS

Age at Entry	Exposure		Actual Deaths		Percentage of Actual to Expected	
	No.	Amount	No.	Amount	No.	Amount
			Select			
15-29	17,584	$35,122,800	59	$133,500	91.2%	103.3%
30-44	23,133	85,898,700	93	290,922	87.4	72.7
45	4,745	24,185,400	36	179,000	71.0	67.6
TOTAL	45,462	145,206,900	188	603,422	84.8	76.0
			Ultimate			
Attained Age						
20-34	6,194	10,462,200	36	57,000	129.5%	121.0%
35-49	11,157	31,797,400	56	198,689	75.7	91.0
50	3,102	14,133,800	36	252,998	60.2	89.8
TOTAL	20,453	56,393,400	128	508,687	79.2	93.0
			Total			
	65,915	201,600,300	316	1,112,109	82.4	82.9

In this group are included applicants with a history of colic, indigestion, biliousness, autointoxication, etc., etiology undetermined. The exposure during the first policy year was, perhaps accidentally, considerably worse both by number and by amount than during other policy years. The actual deaths in all policy years due to appendicitis, typhilitis, biliary calculi and ulcer of the stomach were two and a half times the expected. The experience on similar gastro-intestinal disorders occurring more than five years before application for insurance was appreciably more favorable with negligible deaths due to the specified causes. In the combined groups the actual deaths due to these causes were less than twice the expected. The exposure and experience appear to be sufficient to permit the underwriting conclusion that such histories in the average do not mask material impairments.

GOITRE

Age at Entry	Exposure		Actual Deaths		Percentage of Actual to Expected	
	No.	Amount	No.	Amount	No.	Amount
			Select			
15-29	1,234	$2,062,400	7	$9,000	160.2%	123.2%
30-44	839	2,864,500	4	50,000	111.0	393.1
45	161	518,700	2	6,000	119.2	111.9
TOTAL	2,234	5,445,600	13	65,000	134.7	256.0
			Ultimate			
	409	726,800	7	15,884	240.9	255.2
			Total			
	2,643	6,172,400	20	80,884	159.3	255.9

This group consists largely of entries at the younger ages. Only such cases as were free from symptoms of hyperthyroidism, in which there was no history of such symptoms and in which the degree of enlargement had remained stationary for some years were included in this group. The results have been sufficiently unfavorable to justify consideration, even though the group is small. They show approximately twice the company's general mortality by number and worse by amounts. The causes of death were well distributed, showing no pronounced relationship between impairment and result. There were no war claims and only two for $2,500 due to influenza. The only extraordinary claim was on an insured, aged 42, with three policies totaling $45,000 who committed suicide when about to be convicted of bribery after falsifying the income tax returns of the company of which he was an officer. This unfavorable experience may possibly be due to lack of differentiation between colloid and adenomatous types of goitre. The proposed joint investigation may show very different results.

INORGANIC CARDIAC MURMURS

Age at Entry	Exposure		Act'l Deaths		Percentage of Actual to Expected			
					Amer. Men		Med. Act.	
	No.	Amount	No.	Amount	No.	Amount	No.	Amount
				Select				
15–29	5,220	$13,694,800	18	$38,000	96.1%	77.4%	81.4%	65.6%
30–44	5,772	29,834,300	22	128,190	86.5	96.6	75.6	84.6
45	1,004	9,555,300	4	151,000	40.2	159.0	36.6	144.9
Total	11,996	53,084,400	44	317,190	81.3	114.6	70.8	101.1
				Ultimate				
	2,190	6,773,900	10	23,500	61.5	39.8	62.9	41.6
				Total				
	14,186	59,858,300	54	340,690	76.7	101.5	69.2	92.0

This experience by numbers is much more favorable than that shown in the Special Joint Investigation of 1920 by the Association of Life Insurance Medical Directors and the Actuarial Society of America. It should of course, be remembered not only that our experience is more limited than the other but that ours is dependent upon our selection of such risks. Our experience to the anniversary in 1918 entered into the general investigation. Our experience by amounts is largely dependent upon two suicides, one from melancholia in the amount of $50,000 in the second policy year at age 39 and the other of two policies in the amount of $50,000 each in the fourth policy year at age 48. This calls to mind the observation of psychiatrists to the effect that those suffering from manic depressive insanity are particularly prone to exhibit cardiac lesions. One other claim for $50,000 in the first year at age 46 was due to acute indigestion causing heart failure by pressure of gases from the stomach. It might be mentioned even though the joint investigation was by policies instead of by amounts that none of these

large policies had become claims early enough to enter into it. Claims in this group dependent upon cardiac and cardio-vascular diseases were expected $36,354, actually $10,190 by amount.

VARICOSE VEINS

	Exposure		Actual Deaths		Percentage of Actual to Expected	
	No.	Amount	No.	Amount	No.	Amount
Select	6,395	$24,497,800	29	$121,801	99.3%	105.4%
Ultimate	1,614	5,307,100	9	43,500	75.9	105.9
TOTAL	8,009	29,804,900	38	165,301	92.6	105.5

This experience is satisfactory by numbers but not by amount. The largest claim was for $20,000, due to angina pectoris.

ONE BROTHER OR SISTER DIED OF TUBERCULOSIS—AVERAGE WEIGHT GROUP

Age at Entry	Exposure		Actual Deaths		Percentage of Actual to Expected	
	No.	Amount	No.	Amount	No.	Amount
			Select			
15–29	7,106	$13,797,100	25	$39,500	95.6%	77.8%
30–44	17,330	62,346,000	47	191,008	57.4	63.8
45	5,825	24,763,700	39	231,907	62.3	90.1
TOTAL	30,261	100,906,800	111	462,415	65.1	76.1
			Ultimate			
Attained Age						
20–34	2,298	3,819,500	13	24,378	125.6	141.4
35–49	8,849	21,845,800	39	86,000	62.4	53.8
50	5,280	18,095,100	97	395,767	84.1	104.7
TOTAL	16,427	43,760,400	149	506,145	79.2	91.1
			Total			
	46,688	144,667,200	260	968,560	72.5	83.3

ONE BROTHER OR SISTER DIED OF TUBERCULOSIS—ALL WEIGHT GROUPS COMBINED

Age at Entry	Exposure		Actual Deaths		Percentage of Actual to Expected	
	No.	Amount	No.	Amount	No.	Amount
			Select			
15–29	8,873	$16,962,800	32	$47,500	97.9%	76.0%
30–44	22,125	79,928,900	78	337,008	74.2	87.3
45	7,660	33,671,900	57	420,213	68.8	117.2
TOTAL	38,658	130,563,600	167	804,721	75.7	99.7
			Ultimate			
Attained Age						
20–34	2,887	4,803,700	16	27,378	123.1	126.3
35–49	11,226	28,733,400	55	138,000	69.0	65.1
50	7,102	24,463,400	132	494,495	84.6	94.5
TOTAL	21,215	58,000,500	293	659,873	81.6	87.2
			Total			
	59,873	188,564,100	370	1,464,594	78.8	93.7

ONE PARENT DIED OF TUBERCULOSIS—AVERAGE WEIGHT GROUP

Age at Entry	Exposure		Actual Deaths		Percentage of Actual to Expected	
	No.	Amount	No.	Amount	No.	Amount
			Select			
15–29	7,233	$14,160,200	26	$61,500	98.3%	119.3%
30–44	11,013	40,134,400	34	92,500	66.0	48.8
45	2,714	12,901,800	9	42,500	31.3	30.8
TOTAL	20,960	67,196,400	69	196,500	64.7	51.8
			Ultimate			
Attained Age						
20–34	2,402	3,865,000	14	33,500	129.7	192.6
35–49	6,274	16,578,500	20	40,706	46.3	34.6
50	2,505	9,694,400	52	125,324	94.9	49.7
TOTAL	11,181	30,137,900	86	199,530	79.1	51.5
			Total			
	32,141	97,334,300	155	396,030	71.9	51.7

ONE PARENT DIED OF TUBERCULOSIS—ALL WEIGHT GROUPS COMBINED

Age at Entry	Exposure		Actual Deaths		Percentage of Actual to Expected	
	No.	Amount	No.	Amount	No.	Amount
			Select			
15–29	8,762	$16,872,900	34	$75,605	106.3%	123.1%
30–44	13,357	48,369,400	45	147,500	71.7	64.0
45	3,434	15,744,200	19	70,804	51.3	42.4
TOTAL	25,553	80,986,500	98	293,909	74.4	64.1
			Ultimate			
Attained Age						
20–34	2,743	4,378,600	15	34,500	121.8	175.1
35–49	7,222	18,832,500	27	51,706	54.1	38.6
50	3,110	11,742,800	70	201,830	100.4	68.0
TOTAL	13,075	34,953,900	112	288,036	84.9	63.9
			Total			
	36,628	115,940,400	210	581,945	79.6	64.0

Overweight Group

The experience was analyzed into three weight groups, a so-called average weight group, an overweight group involving the Medico-Actuarial build codes, 2 to 5, or about 15% or more overweight, and an underweight group, codes 7, 8 and 9, or about 15% or more underweight. As the overweight group includes considerable exposure on policies issued before the lessons of the Medico-Actuarial Experience on overweights were available, the mortality rate on standard lives is very high as indicated below—thus being a distinct warning against considering overweight in anyway as counteracting the family history of tuberculosis.

	Exposure		Actual Deaths		Percentage of Actual to Expected	
	No.	Amount	No.	Amount	No.	Amount
ONE BROTHER OR SISTER DIED OF TUBERCULOSIS						
Select	4,769	$20,507,200	37	$307,806	114.1%	202.5%
Ultimate	3,045	10,337,000	45	142,006	98.0	84.9
TOTAL	7,814	30,844,200	82	449,812	104.6	140.8
ONE PARENT DIED OF TUBERCULOSIS						
Select	1,973	7,222,000	20	77,804	152.1	165.9
Ultimate	1,084	2,621,700	22	58,506	131.5	146.1
TOTAL	3,057	9,843,700	42	136,310	140.6	156.8

The exposure in the group used as average weight was so great comparatively that despite the poor experience in all the overweight groups and poor experience in some of the underweight groups, the total experience is favorable. This is the most interesting feature as possibly indicating a tendency to better education of the public enabling susceptible persons to avoid the disease or postpone its consequences, but the comparatively small exposure must not be forgotten. Of course, our experience at young ages was unfavorable, both during the select and the ultimate periods. Our experience also confirms the Medico-Actuarial experience in that the incidence of mortality between the one parent group and the one brother or sister group is similar. This is true both for the select and ultimate periods as far as age groups (all weight groups combined) are concerned and also as far as weight groups (all age groups combined) except that our mortality on overweights happened to be greater in the case of the parent experience. The summarized results are almost identical. This analysis is based on the number of policies as certain large claims caused greater irregularity in the experience by amounts.

Our actual claims due to tuberculosis were about twice the expected on the substandard business but only about 75% on the standard business, being practically the same as the expected on the combined standard and substandard in the case of the

parent experience but only about 75% of the expected in the brother or sister experience. On the total overweight classes the actual was negligible but was about 150% of the expected in the underweight and about 85% in the average weight group.

As our exposure on these classes is so small compared with that in the Medico-Actuarial Investigation with its more than 10,000 deaths, and as the ratings on these classes is so thoroughly discussed by Dr. Rogers and Arthur Hunter in the Transactions of the Actuarial Society, Vo. XX, 291 and Vol. XXII, 346, only a few of our results are given to suggest the possibility of certain tendencies in this experience.

In this class we also investigated cases rated for these impairments where no other important impairment was present. The resulting experience was distinctly substandard itself but was such a small proportion of the standard that the experience in the latter classes was not materially affected by the addition of the substandard (less than 2% in the total select, total ultimate and combined groups in the case of a brother or sister and correspondingly less than 5% in the case of a parent). That given above is on the standard business only.

HISTORY OF PLEURISY OTHER THAN PURULENT

Age at Entry	Exposure		Actual Deaths		Percentage of Actual to Expected	
	No.	Amount	No.	Amount	No.	Amount
			Select			
15–29	2,381	$5,297,600	12	$14,000	138.8%	72.8%
30–44	3,706	13,579,400	10	23,000	60.7	38.2
45	952	3,807,300	10	32,000	92.4	77.2
TOTAL	7,039	22,684,300	32	69,000	89.0	57.1
			Ultimate			
Attained Age						
20–34	709	1,198,400	4	4,500	125.2	83.2
35–49	1,703	4,961,700	9	51,000	78.6	148.9
50	693	2,958,700	16	87,613	91.1	120.5
TOTAL	3,105	9,118,800	29	143,113	90.0	127.4
			Total			
	10,144	31,803,100	61	212,113	89.5	90.9

This group was too small to study on the basis of time elapsed between history and acceptance. It is also small compared with the material that entered into the Medico-Actuarial Investigation, so that too much weight should not be given to the considerably more favorable mortality shown here. This mortality is also lower than that shown by the Penn Mutual experience given by Dr. Harry Toulmin and Oliver W. Perrin in the Transactions of the Actuarial Society of America, Vol. XXI, page 154. and is also lower than that of the Equitable given by R. D. Murphy in discussing the above paper, but again it should be remembered that the exposure in the Penn Mutual experience is greater than that given here. The lives exposed were naturally selected with especial care. It is significant, however, that this confirms such previous experience in showing comparatively higher mortality at the younger ages.

This mortality as a whole is not unfavorable, especially when it is considered that a claim for $50,000 in the twentieth policy year at attained age 66 is included. The deaths from respiratory infections, including tuberculosis, were almost double the expected.

LACK OF LONGEVITY IN FAMILY HISTORY

Age at Entry	Exposure		Actual Deaths		Percentage of Actual to Expected	
	No.	Amount	No.	Amount	No.	Amount
			Select			
15–29	1,343	$2,555,000	2	$3,500	40.4%	37.3%
30–44	2,130	5,832,000	7	10,961	70.5	39.3
45	796	3,672,600	9	119,500	103.4	286.9
TOTAL	4,269	12,059,600	18	133,961	76.3	169.8
			Ultimate			
	2,284	5,222,600	19	89,090	78.9	140.6
			Total			
	6,553	17,282,200	37	223,051	77.6	156.8

This class includes cases with neither parent surviving 50 years and at least half of the brothers and sisters dead. The experience while limited is favorable by number and very unfavorable by amount. The exposure is so small that this may be accidental but it brings to one's mind a suggestion of self selection. One large claim, however, for $100,000 was due to cerebral hemorrhage which apparently accounts for the excess mortality by amount. The deceased's father died at 40 of inflammatory rheumatism, mother at 42—cause unknown, and one brother at 55 of organic heart disease. Applicant was about 10% overweight.

HISTORY OF PREVIOUS REJECTIONS OR IMPAIRMENTS (ALL COMPANIES)

Age at Entry	Exposure		Actual Deaths		Percentage of Actual to Expected	
	No.	Amount	No.	Amount	No.	Amount
			Select			
15–29	11,619	$31,301,400	52	$133,753	122.5%	117.7%
30–44	26,909	124,127,200	114	492,624	92.8	85.7
45	7,659	46,380,000	77	369,327	91.3	72.6
TOTAL	46,187	201,808,600	243	995,704	97.4	83.2
			Ultimate			
Attained Age						
20–34	2,224	4,850,800	9	16,000	89.7	72.9
35–49	7,682	26,016,800	49	165,590	92.6	88.5
50	3,423	17,499,900	61	381,105	86.7	106.0
TOTAL	13,329	48,367,500	119	562,695	89.3	98.9
			Total			
	59,516	250,176,100	362	1,558,399	94.6	88.3

The experience on this group is not unfavorable. The lives exposed were, of course, selected with particular care and accepted for standard insurance only after careful investigation or re-examination as regarded the recorded impairment.

ALBUMIN WITHOUT CASTS FOUND ON EXAMINATION

Age at Entry	Exposure		Actual Deaths		Percentage of Actual to Expected	
	No.	Amount	No.	Amount	No.	Amount
			Select			
15–29	5,073	$10,434,400	13	$24,500	73.4%	66.9%
30–44	2,833	11,907,100	13	30,000	110.3	56.8
45	251	2,410,500	...	.....	0	0
TOTAL	8,157	24,752,000	26	54,500	81.7	49.2
			Ultimate			
	291	545,900	0	0	0	0
			Total			
	8,448	25,297,900	26	54,500	77.9	47.9

ALBUMIN WITHOUT CASTS WITHIN TWO YEARS

Age at Entry	Exposure		Actual Deaths		Percentage of Actual to Expected	
	No.	Amount	No.	Amount	No.	Amount
			Select			
15–29	3,374	$7,404,900	11	$14,500	91.1%	55.1%
30–44	4,365	23,660,500	24	101,153	121.3	92.4
45	1,011	6,146,200	12	94,000	117.4	149.6
TOTAL	8,750	37,211,600	47	209,653	111.7	105.6
			Ultimate			
	950	3,017,700	7	12,000	105.8	42.2
			Total			
	9,700	40,229,300	54	221,653	110.9	97.6

ALBUMIN WITHOUT CASTS ON EXAMINATION OR WITHIN TWO YEARS

Age at Entry	Exposure		Actual Deaths		Percentage of Actual to Expected	
	No.	Amount	No.	Amount	No.	Amount
			Select			
15-29	8,447	$17,839,300	24	$39,000	80.6%	62.0%
30-44	7,198	35,567,600	37	131,153	117.1	80.8
45	1,262	8,556,700	12	94,000	95.7	111.7
TOTAL	16,907	61,963,600	73	264,153	98.8	85.4
			Ultimate			
	1,241	3,563,600	7	12,000	85.7	38.1
			Total			
	18,148	65,527,200	80	276,153	97.5	81.0

Those risks accepted standard with albumin found on examination presented negative microscopical findings with not more than a trace or one plus of albumin by the cold nitric acid contact test. In those over 35 years of age additional specimens were found to be negative both chemically and microscopically. Cases with a history of albumin were accepted only after negative microscopical findings. All the specimens were examined at the home office or at the office of a referee in whose laboratory the standards and methods were similar to those followed in the home office laboratory. These cases were naturally reasonably free from other points of criticism. This experience is so much more favorable than the results obtained in the Medico-Actuarial Investigation as well as those given by Dr. Rogers and Arthur Hunter (Transactions of the Actuarial Society of America, Vol. XVIII, 239 and XXII, 345), by Mr. Henderson (Transactions of the Actuarial Society of America, XIX, 115), by Mr. Strong (Transactions of the Actuarial Society of America, Vol. XXII, 378) and by Dr. Knight in the Proceedings of the Association of Life Insurance Medical Directors, 1921-1922, that, of course, all differences in the quantity found and whether

it is constant, intermittent or accidental must be borne in mind. Weight should also be given to the limited exposure shown here and also to the fact that the ultimate exposure is comparatively very small, due to accepting these cases at standard rates only comparatively recently. Higher mortality is to be expected when the insured now included at young ages reach middle life. While, as previously indicated, the relative maturity should be borne in mind in connection with all such experience, in no other impairment investigated in this paper is the exposure on young insured during select years so predominant in the total. It is difficult to compare this with the experience given by Dr. Ogden in the Proceedings of the Association of Life Insurance Medical Directors, 1916, even as to which shows more favorable mortality, because of the great differences in the mortality tables used as the standard of comparison. It will be noted that the experience on the class showing albumin on examination is more favorable than is the class showing a history of albumin without casts reported within two years. These ratios are too low to be explained other than as an accidental fluctuation due to the inadequacy of the data, the relative lack of maturity of the exposure not being an adequate cause. I have no other explanation for this experience although it occurs to me that there may be an element of self selection and preparation before undergoing examination in the class who had previously had difficulty in obtaining insurance. The experience has been less favorable upon the cases of older ages, in conformity with similar experience previously presented to the Association. Claims due to nephritis gave a ratio of actual to expected of four times the normal, but one claim constituted about half of the total due to this cause.

HISTORY OF TYPHOID FEVER

	Exposure		Actual Deaths		Percentage of Actual to Expected	
	No.	Amount	No.	Amount	No.	Amount
			Attack Within Five Years			
Select	13,931	$36,680,200	37	$87,000	61.5%	50.2%
Ultimate	9,605	22,998,100	68	186,677	101.9	94.6
Total	23,536	59,678,300	105	273,677	82.7	73.8
			Last Attack More Than Five Years Previous			
Select	37,439	120,840,300	158	722,583	84.0	109.4
Ultimate	22,173	66,119,000	186	551,622	85.7	74.8
Total	59,612	186,959,300	344	1,274,205	84.9	91.1
			Combined			
Age at Entry			*Select*			
15-29	19,598	39,754,200	61	134,000	84.9	92.1
30-44	26,467	94,593,400	91	532,583	76.1	119.8
45	5,305	23,172,900	43	143,000	75.7	58.7
Total	51,370	157,520,500	195	809,583	78.6	97.1
			Ultimate			
Attained Age						
20-34	7,877	14,201,700	35	56,976	99.0	89.2
35-44	17,625	50,350,600	105	309,469	87.9	87.3
50	6,276	24,564,800	114	371,854	88.4	71.9
Total	31,778	89,117,100	254	738,299	89.5	78.9
			Total			
	83,148	246,637,600	449	1,547,882	84.4	87.5

This experience was analyzed according to the time elapsed between the attack and application for insurance. Whether or not the lower mortality during the select period and higher mortality during the ultimate on cases showing recent attacks is significant is not clear. The high mortality by amounts during the select period in the second group is due to a $200,000 claim in the first policy year at age 32. History of typhoid appears

to have had little effect on the mortality. There were $7,653 expected claims due to biliary calculi but no actual claims.

HISTORY OF MALARIA OTHER THAN PERNICIOUS OR REMITTENT

Age at Entry	Exposure		Actual Deaths		Percentage of Actual to Expected	
	No.	Amount	No.	Amount	No.	Amount
			Select			
15-29	7,429	$13,915,900	26	$43,000	95.4%	84.6%
30-44	9,740	31,560,000	38	140,326	84.6	95.1
45	1,974	8,205,700	17	58,573	80.9	73.3
TOTAL	19,143	53,681,600	81	241,899	87.0	86.9
			Ultimate			
Attained Age						
20-34	2,919	4,929,600	21	46,336	160.2	208.9
35-49	6,524	16,448,000	28	53,984	63.7	47.0
50	2,178	6,872,200	31	140,000	73.8	107.1
TOTAL	11,621	28,249,800	80	240,320	80.7	89.8
			Total			
	30,764	81,931,400	161	482,219	83.8	88.3

This includes ordinary chills and fever, fever and ague, malaria, and intermittent fever. This experience is so much more favorable than that obtained in the Medico-Actuarial Investigation, Vol. V, and the latter covered such a large exposure, that probably this should be interpreted merely as meaning that a reasonable mortality may be obtained by strict selection. Of course, slightly more favorable experience should be expected because the exposure is more recent than the Medico-Actuarial investigation. Further it is possible that it contains a larger proportion of favorable components by residence but it is not extensive enough to warrant subdivision. It is also possible that more cases are included where the attack was slight. Our claims due to typhoid, malaria and tuberculosis were considerably less than the expected, and the total is less than the expected when pneumonia is also included.

HISTORY OF ACUTE INFECTIOUS DISEASES

One Attack Within 2 Years of Date of Application (Class A)

Age at Entry	Exposure		Actual Deaths		Percentage of Actual to Expected	
	No.	Amount	No.	Amount	No.	Amount
			Select			
15-29	49,055	$109,285,700	123	$237,471	71.2%	61.7%
30-44	52,900	214,253,600	198	832,172	86.6	89.7
45	7,969	36,824,100	44	173,500	55.3	48.5
TOTAL	109,924	360,363,400	365	1,243,143	75.9	74.4
			Ultimate			
Attained Age						
20-34	9,140	15,080,000	39	72,000	95.5	106.5
35-49	12,986	36,107,800	78	245,737	90.9	99.8
50	3,946	13,502,400	77	237,609	96.8	77.2
TOTAL	26,072	64,690,200	194	555,346	94.1	89.3
			Total			
	135,996	425,053,600	559	1,798,489	81.3	78.5

HISTORY OF ACUTE INFECTIOUS DISEASES

One Attack Within 3 to 5 Years of Date of Application (Class B)

Age at Entry	Exposure		Actual Deaths		Percentage of Actual to Expected	
	No.	Amount	No.	Amount	No.	Amount
			Select			
15-29	20,944	$42,524,500	91	$202,153	122.3%	134.8%
30-44	19,178	75,389,200	70	491,112	81.3	145.9
45	3,811	17,321,000	30	145,177	75.1	81.2
TOTAL	43,933	135,234,700	191	838,442	95.3	126.0
			Ultimate			
Attained Age						
20-34	6,127	10,076,100	31	67,000	113.3	148.6
35-49	8,428	22,279,100	47	251,627	84.5	162.6
50	2,880	9,556,900	55	240,533	91.5	130.4
TOTAL	17,435	41,912,100	133	559,160	92.9	145.5
			Total			
	61,368	177,146,800	324	1,379,602	94.3	133.2

HISTORY OF ACUTE INFECTIOUS DISEASES

One Attack Within 6 to 10 Years of Date of Application (Class C)

Age at Entry	Exposure		Actual Deaths		Percentage of Actual to Expected	
	No.	Amount	No.	Amount	No.	Amount
			Select			
15-29	19,747	$39,786,400	81	$156,000	113.9%	109.0%
30-44	15,973	59,364,600	65	220,153	90.2	80.7
45	3,434	13,556,800	30	116,100	82.3	84.7
TOTAL	39,154	112,707,800	176	492,253	98.0	89.0
			Ultimate			
Attained Age						
20-34	6,952	11,676,100	23	40,000	74.1	76.5
35-49	9,214	22,488,700	50	114,402	82.7	75.2
50	2,986	9,508,100	42	198,598	67.5	108.4
TOTAL	19,152	43,672,900	115	353,000	74.8	91.1
			Total			
	58,306	156,380,700	291	845,253	87.3	89.8

HISTORY OF ACUTE INFECTIOUS DISEASES

One Attack More Than 10 Years Prior to Date of Application (Class D & J)

Age at Entry	Exposure		Actual Deaths		Percentage of Actual to Expected	
	No.	Amount	No.	Amount	No.	Amount
			Select			
15-29	33,253	$67,973,900	142	$296,441	117.0%	119.4%
30-44	33,296	126,043,400	120	470,786	78.3	79.9
45	8,368	40,275,100	65	339,634	70.4	78.8
TOTAL	74,917	234,292,400	327	1,106,861	89.1	87.3
			Ultimate			
Attained Age						
20-34	11,289	19,041,200	54	83,914	107.0	98.3
35-49	21,508	57,673,600	133	400,005	90.8	98.9
50	9,837	36,129,800	211	1,008,027	98.1	127.3
TOTAL	42,634	112,844,600	398	1,491,946	96.6	116.4
			Total			
	117,551	347,137,000	725	2,598,807	93.0	101.9

HISTORY OF ACUTE INFECTIOUS DISEASES

Total All Time Codes Combined

Age at Entry	Exposure		Actual Deaths		Percentage of Actual to Expected	
	No.	Amount	No.	Amount	No.	Amount
			Select			
15-29	137,255	$290,807,200	486	$979,170	99.1%	91.8%
30-44	133,698	533,564,100	494	2,132,890	83.0	89.4
45	25,588	119,746,200	173	833,411	64.1	68.0
TOTAL	296,341	944,117,500	1,153	3,945,471	85.1	84.3
			Ultimate			
Attained Age						
20-34	36,977	61,451,600	165	286,369	99.9	104.0
35-49	56,893	153,148,200	328	1,053,293	86.4	99.5
50	21,286	76,006,000	407	1,770,382	89.7	108.4
TOTAL	115,156	290,605,800	900	3,110,044	90.1	104.8
			Total			
	411,697	1,234,723,300	2,053	7,055,515	87.2	92.3

As our experience on this impairment is comparatively more extensive than may be available in almost any company, since few companies have included this among their impairments that are coded for mortality investigation purposes, more details are given than in the case of the other impairments particularly as to the period between the disease and the application for insurance. It will be noted that our experience includes over 400,000 years of exposure amounting to $1,250,000,000 and involves over 2,000 deaths for about $7,000,000. The original instructions were to include in this impairment "such diseases as Typhus Fever, Relapsing Fever, Smallpox, Scarlet Fever, Influenza, Dengue, Cerebro-spinal Meningitis, Lobar Pneumonia, Diphtheria, Erysipelas, Yellow Fever and Epidemic Catarrhal Jaundice." In the course of various rulings during the process of coding impairments, various diseases which were supposed to have possibly similar effects have been added such as Broncho-Pneumonia, Tonsilitis, Mumps, Measles, Para-typhoid

Fever, Septicemia and Varioloid. Of course, it is probable that in most histories of disease given in applications for insurance, diseases like Measles are not even mentioned in the medical examination. Furthermore they can be considered to be fairly well eliminated in the different subdivisions according to time except in subdivision D-J. The investigation of this impairment was different from any other except Goitre in that every standard card was used regardless of any other impairment on the same card.

To throw possible light on the effect of these diseases, the following summary of the actual as compared with the expected claims due to certain diseases is given from which it appears that claims due to Heart Disease were appreciably heavier than the expected, but that those due to Cerebral Hemorrhage and Apoplexy and also Nephritis were less. Also the claims due to these diseases were decidedly less than the expected for some time after the disease, and considerably more where the disease had occurred a considerable time before the exposure. This holds true despite the fact that the method of working the expected deaths makes rough allowance for age distribution.

Class	Cerebral Hemorrhage	Diseases of Heart and Arteries	Nephritis	Total
A Expected.....	$135,000	$255,000	$161,000	$551,000
Actual.....	73,000	197,000	35,000	305,000
B Expected.....	68,000	124,000	82,000	274,000
Actual.....	29,000	140,000	23,000	192,000
C Expected.....	61,000	111,000	75,000	247,000
Actual.....	76,000	178,000	24,000	278,000
D Expected.....	199,000	362,000	232,000	793,000
Actual.....	251,000	642,000	104,000	997,000
Other Expected	52,000	97,000	63,000	212,000
Actual.....	21,000	65,000	10,000	96,000
TOTAL Expected...	515,000	949,000	613,000	2,077,000
Actual.....	450,000	1,222,000	196,000	1,868,000

Of course, large policies disturbed this analysis. There were six claims in the above ranging from $25,000 to $200,000 in Class D and two claims for $50,000 and $60,000, respectively, in Class C.

The general conclusion from this experience is that such histories have no important effect on mortality. Cases showing one attack in two years are really favorable. The Select mortality on Class B (showing one attack within 3 to 5 years), Class C (within 6 to 10 years), Class D-J (more than 10 years) was not so favorable. The general statement may, therefore, be made that mortality was very favorable during something like five or six years after the infectious disease and was less favorable thereafter. This statement includes all Ultimate experience and the Select experience when the exposure commences several years after the disease. The mortality on cases showing two attacks was investigated in two groups as to whether the last attack was within five years or more than five years previous. Mortality in both these classes was inexplicably somewhat more favorable than in the other classes although the exposure appeared to be quite large. They are included in the table of total experience. More attention should, of course, be paid to the experience by Numbers as various large policies were included.

Dr. Grosvenor—It is with profound regret that I announce the death of three of the members of the Association, during the past year—Dr. W. W. Hitchcock, Medical Director of the Occidental Life Insurance Company, of Los Angeles, California, who was elected to membership in this Association at our last Annual Meeting; Dr. Francis D. Merchant, of the Mutual Life Insurance Company of New York; and Dr. William R. Miller, of the Aetna Life Insurance Company, of Hartford, Conn. Dr. Wm. Evelyn Porter will present a memorial on the death of Dr. Merchant,

and Dr. Howard K. Root will read a memorial on the death of Dr. Miller.

Dr. Porter read the following memorial on the death of Dr. F. D. Merchant:

DR. FRANCIS D. MERCHANT

1866-1923

Dr. Francis D. Merchant, a Medical Director of the Mutual Life Insurance Company of New York from 1907 until his death, died on January 13, 1922, in the fifty-seventh year of his age, after a protracted illness.

He was born in Washington, D. C. on October 11, 1866 and received his education at Columbian University of Washington, D. C. and the College of Physicians and Surgeons, New York City, where he graduated in 1890. Following his graduation he went to Batopilas, Mexico, as Surgeon to the Batopilas Mining Company, where he remained until 1902. After his return to New York he became connected with the Mutual Life Insurance Company in 1903 as Medical Examiner, becoming Assistant Medical Director in 1906 and full Medical Director in 1907.

He was a member of the New York Academy of Medicine and of the Wykagyl Country Club.

He was buried in Washington, D. C.

Dr. Merchant is survived by his wife who was Grace Shepherd, a daughter of former Governor Alexander R. Shepherd of Washington, D. C.

Dr. Merchant was elected a member of this Association in 1906 and was, from time to time, present at our meetings and took part in our scientific discussions.

His death was a matter of keen regret and a sense of personal loss to his associates and a wide circle of friends to whom he had endeared himself by his unfailing kindliness and generosity.

Dr. Root read the following memorial on the death of Dr. Miller:

DR. WILLIAM R. MILLER

1873-1923

Dr. William Radley Miller, late Associate Medical Director of the Aetna Life Insurance Company, was born in Schenectady, New York, March 18, 1873, and died at his home in Southington, August 20, 1923, after a long illness of cancer of the pancreas.

Dr. Miller graduated from the Albany Medical College in 1898, and served as resident physician in the Hartford Hospital from 1898 to 1899, and from February, 1900 to February, 1901. On graduating from the Hospital he removed to Southington where he soon obtained a large general practice. After a few years he was appointed physician to the State Reformatory at Cheshire, Connecticut, where his observation of the mental as well as physical characteristics of the inmates of the Reformatory met his attention and excited his interest in the special study of psychiatry and diseases of the nervous system, and he instituted many innovations based upon this knowledge and experience in that institution.

At the commencement of War he enlisted in the Medical Corps of the Army and served during the continuance of the War as specialist in neurology and psychiatry in various army hospitals. Upon his release from the Army he was appointed Associate Medical Director, which office he served until his death.

Dr. Miller brought to the problem of medical underwriting not only a fund of experience based upon many years general practice, but in addition his special knowledge in neurology and psychiatry which proved of inestimable service to the Company he served and was of the utmost value in deciding many of the complex problems of medical underwriting in certain types of cases.

His associates in the Aetna Life Insurance Company and his many warm personal friends in and outside of the medical profession have to deplore the loss of a competent adviser and an admirably fitted practitioner in his specialty, and extremely regret that he should be cut off in the prime of his activity.

On motion these memorials were ordered spread upon the minutes of the Association.

Dr. Grosvenor—We will now hear the report of the Nominating Committee, of which Dr. T. H. Willard is Chairman.

Dr. Willard presented the following report:

"October 17th, 1923.

"The Nominating Committee of the Executive Council desires to make the following nominations of candidates for election as officers and as members of the Executive Council, to be elected by the Association:

President—William R. Ward, M.D.
1st Vice-President—C. F. S. Whitney, M.D.
2nd Vice-President—Angier B. Hobbs, M.D.
Secretary—Chester F. Brown, M.D.
Treasurer—C. L. Christiernin, M.D.
Editor of the Proceedings—Eugene F. Russell, M.D.
Members of the Executive Council—George A. Van Wagenen, M.D., Edwin W. Dwight, M.D., J. Allen Patton, M.D., W. W. Beckett, M.D., John B. Steele, M.D.

All of which is respectfully submitted,

CHESTER T. BROWN,
ROBERT M. DALEY,
W. E. PORTER,
C. F. S. WHITNEY,
T. H. WILLARD, Chairman."

The Secretary announced that he had asked the Nominating Committee to relieve him of his duties as Secretary. He thanked the members for the hearty cooperation which he had received from them during his term of service as Secretary and expressed appreciation of the opportunity which he had had for being of some service to the Association.

Dr. Willard—May I at this time ask the privilege of making a motion expressing the thanks of this Association and its appreciation of the excellent service that has been rendered to this Association by our Secretary, Dr. Hobbs, during the past five years?

The motion was seconded and carried by a rising vote.

Dr. Grosvenor—Are there any further nominations? If not, a motion is in order that the nominations be closed.

No further nominations being presented, it was moved by Dr. Jaquith and seconded by Dr. Porter, that the nominations be declared closed and the Secretary instructed to cast a ballot on the morning following in favor of the election of the Officers and Members of the Executive Council as nominated by the Nominating Committee. The motion was carried.

The Treasurer, Dr. C. L. Christiernin, read his report. The Auditing Committee, Dr. Jaquith and Dr. Whitney, reported that the Committee had audited the Treasurer's report and found it correct. On motion, the report of the Treasurer was accepted with thanks and placed on file.

Dr. O. H. Rogers, Chairman of the Special Committee in charge of the M. I. B., presented the report of that Committee which was accepted with thanks and ordered placed on file.

Dr. J. W. Fisher, Chairman of the Committee on Blood Pressure, stated that the Committee had no report to present.

Dr. Thomas H. Willard, Chairman of the Committee on Public Health made the following report:

"The letter which was read at the meeting of the Executive Council from the Friends of Medical Progress is the only communication which has come to the attention of your Committee. The Committee hopes that the members of the Association will look very carefully into this matter and study the literature which is here for distribution. It is proposed that there shall be conducted all over this broad land a movement of education on the part of the general public to combat the errors and to offset the propaganda that the Anti-Vivisectionists and Anti-Vaccinationists and other people of the kind are continually afflicting the public press with. We believe the movement is in charge of people who are intelligent and ethical and that the campaign is one which appeals to every lover of intelligence and progress in the affairs of this country."

On motion, the report of the Committee on Public Health was accepted and placed on file.

Dr. Porter, on behalf of Dr. Symonds, read the following report of the Committee appointed to review the questions on the medical examination blanks:

The Committee appointed to review the questions on the medical examination blanks, in order to determine that the requirements of the M. I. B. were satisfied, wish to report as follows:

Each company sent copies of its medical blank to the Committee where it was carefully reviewed. In a large majority of the blanks no change was indicated. The most frequent omission related to a past change of residence on account of health, or to a contemplated change of residence, whether for health or business. In individual cases a few other questions were omitted but these were rare. In each case a letter was written to the Medical Director of the Company and the replies were uniformly acquiescent that the omitted questions would be incorporated in the blank. In some cases the questions were already in the application proper. To this no definite objection

could be made, though a statement to a medical examiner is apt to be more reliable.

On the other hand, the Committee felt that it was not within their province to urge the elimination of questions which seemed superfluous. Many blanks contained long lists of diseases which might have been cut down with entire safety but each Medical Director has the right to trim his turban to suit himself. All the blanks contain a certain amount of instructions to the medical examiner which are put in the form of questions. Probably some of this is necessary and unavoidable. Some companies however include a great many questions of this kind which may well be omitted. The Committee did not feel at liberty though to make many suggestions in regard to this excess, for each Medical Director knows his own examiners.

The Committee wishes to commend highly the model blank prepared by the American Life Convention two or three years ago. It has many merits though it has a tendency to group two or more items in one question. This leads to confusion and omissions on the part of the examiner and the applicant.

In conclusion the Committee thinks it advisable for such a Committee to be continued, for as each new company comes into the Association, it needs to have its blank reviewed to determine whether it meets the requirements of the M. I. B.

Respectfully submitted,

Dr. HARRY TOULMIN,
Dr. HENRY W. COOK,
Dr. EDWARD GARVIN, Chairman.

Dr. Hobbs moved that the report be accepted and the Committee continued. Dr. Daley seconded the motion and it was carried.

Dr. Grosvenor—The Committee appointed at the last Annual Meeting to take up the question of the revision of the Constitution and By-Laws will now report.

The Secretary reported that the Committee on the Revision of the Constitution and By-Laws had placed in the hands of each individual member of the Association a copy of the Constitution and By-Laws revised as suggested by the Committee and approved by the Executive Council. The Secretary further reported that Dr. Symonds had suggested a further amendment with reference to Article VIII of the Constitution. As recommended by the Committee, Article VIII reads:

"Election of Officers and Executive Council

"The officers and elective members of the Executive Council shall be elected by ballot at the Annual Meeting of the Association, for the term of one year, or till their successors have been elected and qualified. The President and Vice-President shall not be eligible for the same office for more than three consecutive years."

Dr. Symonds suggestion was that we strike out the concluding sentence—"The President and Vice-President shall not be eligible for the same office for more than three consecutive years."

The Secretary moved that this amendment to the amended Constitution be accepted, Article VIII of the Constitution to read:

"ARTICLE VIII.

"Election of Officers and Executive Council

"The officers and elective members of the Executive Council shall be elected by ballot at the Annual Meeting of the Association for the term of one year, or till their successors have been elected and qualified."

The motion was seconded by Dr. Daley and carried.

On motion by Dr. Rogers, seconded by Dr. Willard, the report of the Committee as to the Constitution was accepted.

The Secretary read a suggestion by Dr. Symonds as to amending Article III, Paragraph 1 of the By-Laws. As submitted by the Committee this paragraph reads:

"The President shall be responsible for the scientific part of the Annual Meeting. He shall appoint members or others to prepare papers and to discuss them. Any expense incurred by him in so doing shall be paid by the Association."

Dr. Symonds suggested that we strike out the period at the end of the last sentence and add the words, "If it has been authorized by the Executive Council."

The Secretary reported that the Committee wished to withdraw Section I, Article 1 of the By-Laws, reading as follows:

"I. No Company, after admission to the Medical Information Bureau, shall maintain a regular interchange with any other Company which is not a member of the Medical Information Bureau."

Dr. Willard moved and Dr. Rogers seconded the motion, that the amendment to Article III of the By-Laws, and the withdrawal of Section I of Article 1 of the By-Laws be accepted. The motion was carried. Article III of the By-Laws, paragraph 1, as amended, reads:

"The President shall be responsible for the scientific part of the Annual Meeting. He shall appoint members or others to prepare papers and to discuss them. Any expense incurred by him in so doing shall be paid by the Association if it has been authorized by the Executive Council."

Dr. Hobbs moved that the By-Laws as amended be accepted as the By-Laws of the Association. Dr. Willard seconded the motion and it was carried.

The Secretary read the following memorandum from Dr. J. W. Fisher:

In the year 1892 a resolution was adopted by this Association recommending that companies so disposed, represented by this Association, enter into a scheme whereby data be collected on certain medical impairments with the view of determining the mortality as an aid to risk selection. About fifteen companies entered into the scheme.

Mr. Emory McClintock, the noted actuary, was consulted as to whether the Actuarial Association would compute mortality when sufficient time had elapsed to furnish reliable results. Mr. McClintock was quite enthusiastic over the scheme and stated the Actuarial Association would gladly co-operate.

In the year 1901 Mr. McClintock suggested by resolution that the Actuarial Association propose to the different companies represented in this organization, to make exhaustive investigations of mortality, impairments, occupations, habitat, etc., etc., and to include in such investigation the issues of 1875-1901 both inclusive. Thirty-four American and Canadian companies entered into the scheme which resulted in the specialized mortality investigation of 1903. The memorandum and modest list of impairments of this Association follows:

MEMORANDUM

Whenever an applicant is accepted in whose application one of the following diseases or conditions is recorded, the Medical

Directors of the Company shall fill out a card according to the printed form, and give a concise history of the case on the reverse side; they shall preserve these cards until called for by a Committee of the Association of Life Insurance Medical Directors.

Whenever a risk is *declined* on account of the presence of albumin or sugar in the urine, and the application shows that the applicant has insurance in another Company, the Medical Directors shall notify that Company on a special slip, in addition to the regular notification through the Library Bureau, and the Company so notified shall fill out the "class" card.

Under Classes 7 and 8, all cases are to be recorded in which the weight is a pound or more above or below the maximum or minimum as given in the table on the reverse of this slip.

The Class Number at the right hand of the card refers to the classification as given below.

Class No.

1.—HÆMOPTYSIS. State number of attacks, dates, severity. Any consumptive family record?

2.—RHEUMATISM. Articular or inflammatory. State number of attacks, when, parts affected and complications.

3.—OTORRHŒA. State how long it has existed and only record cases where there has been a purulent discharge.

4.—RENAL CALCULI OR COLIC. Number of attacks, dates, and whether calculi passed.

5.—HIP JOINT DISEASE. When and how long since active disease existed. Include also cases of curvature of the spine.

6.—ASTHMA. To what extent, when and how often the attacks occur. P. S.—Report also cases where the applicant suffered from asthma up to within five years and claims to have recovered.

7.—OVER-WEIGHT. Is it a family characteristic?

8.—UNDER-WEIGHT. Is it a family characteristic?

9.—SUGAR IN URINE. State when it appeared and how long under observation.

10.—ALBUMIN IN URINE. State when first discovered and whether tube casts were present; also how long under observation.

11.—SYPHILIS. When? Symptoms, treatment.

12.—CONSUMPTIVE FAMILY RECORD. Record cases only where two or more members of immediate family have died of consumption, adding cases also where one parent alone has died of this disease, giving age at death of each member.

This modest list was incorporated in the elaborate list furnished by the thirty-four companies. The specialized investigation in turn led to the more elaborate investigation of the Medical Actuarial Committee completed in 1912 covering issues of 1885-1908 carried to the anniversary of 1909, of which you are all familiar.

It will be seen that credit is due this Association for the first attempt at a collective mortality investigation which eventually led to the exceedingly valuable results as determined by the Medical Actuarial investigation. It is to be hoped that all of the companies which entered into the M. I. B. investigation are following the suggestion of that committee, namely, in continuing the codes on issues since 1908, especially on the smaller classes which were too small to be of much value.

On motion, this memorandum was ordered to be spread upon the minutes of the Association.

The Secretary moved that the Association act upon the recommendation of the Executive Council and elect to Honorary Membership in the Association the following named gentlemen:

Mr. John King Gore, Vice-President and Actuary of the Prudential Insurance Company of America.

Mr. Arthur Hunter, Chief Actuary of the New York Life Insurance Company.

Mr. Archibald A. Welch, Vice-President and Actuary of the Phoenix Mutual Life Insurance Company.

Mr. Edward M. Rhodes, Vice-President of the Mutual Benefit Life Insurance Company.

Dr. Fisher seconded the motion and it was carried unanimously.

AFTERNOON SESSION

The President announced the appointment of the Committee to make a survey of the Medical Examiner situation and see what can be done about maintaining lists of satisfactory Medical Examiners throughout the country, as follows:

Dr. R. M. Daley, Chairman,
Dr. Ross Huston,
Dr. F. S. Weisse,
Dr. C. T. Brown,
Dr. W. W. Dinsmore.

Dr. Grosvenor—Dr. Oscar H. Rogers will now present the paper prepared by him and Mr. Hunter.

MORTALITY STUDY OF IMPAIRED LIVES (NO. 2)

A. APPLICANT NOT ROBUST, PALE, ANEMIC, DELICATE-LOOKING.
B. HIGH BLOOD PRESSURE.

BY DR. OSCAR H. ROGERS AND ARTHUR HUNTER

Applicant Not Robust, Pale, Anemic, Delicate-looking.

Some of the most perplexing questions we are called on to answer have to do with those risks which are described as "Delicate-looking," "Not Robust," "Pale," "Anemic," and the like. A careful examination of these fails to disclose any organic disease, although occasionally there is a heart murmur. The lungs and other vital organs are sound and the most that may be said

of them is that they seem to be on the borderline between health and disease or to be lacking in vitality. Such risks are apt to be a stumbling block to the medical examiner and to the inspector as well. They are at a loss to know how to classify them and their reports disclose the uncertainty of their opinions. It may not be claimed of a group of these risks that it is homogeneous or that the conclusions drawn from a study of it may be applied specifically to any given case hereafter; nor may we expect from such a study to elucidate the pathology which may underlie such cases. We are hopeful, however, that it will possess considerable value as a guide in the handling of cases of this sort—at any rate, for the present and until further light is thrown upon the subject.

From 1896 to 1921 inclusive, our Company has insured 3,780 risks of the sort, all of them on substandard plans. There have been included in the group cases presenting a few other minor impairments. These, however, have not been in sufficient numbers to affect the entire mortality by as much as 5%. An analysis of the group shows that 40% were described as "Not robust," 30% as "Pale" or "Anemic," 15% as "Delicate-looking," and the remainder as "Lacking in resistance," "Pale and thin," and the like. It goes without saying that in the routine selection of these cases of "Anemia" or "Pallor," great care was taken in the examination of the lungs and with regard to the applicant's personal history, so as to exclude tuberculosis. It may also be said that those who were stated to be unhealthy or in poor health and those who seemed to have the disease known as anemia were refused insurance or, if insured, have been excluded from this study. In this investigation there appear the cases only in which the appearance of the applicant was unusual enough to be noted by the medical examiner and in which the impairment had been considered by our medical board of sufficient moment to treat the applicant on a substanard basis.

As build was expected to influence the mortality, the group was divided as follows:

(a) 9% overweight to 9% underweight.
(b) 10% and more underweight.

Among individuals who, in the course of a year, offer themselves to a company for examination, there would normally be twice as many weighing from 9% underweight to 9% overweight as of those weighing 10% and more underweight. In the group under investigation, however, there are nearly three times as many in the latter as in the former group, thus indicating a connection between light weight, the pallor, the lack of vigor, etc. The expected deaths have been calculated by the M. A. (Select) Table. The investigation is on the basis of policies.

NOT ROBUST, PALE, ANEMIC, DELICATE-LOOKING

	Number of Cases	Actual Deaths	Expected Deaths	Ratio of Actual to Expected Deaths
(*a*) Average Weight.....	1045	76	53.1	143%
(*b*) Underweight.....	2735	211	140.8	150
Total.....	3780	287	193.9	148%

Evidently the Company was well advised in treating these cases as substandard.

In group (b) the rating for underweight alone was less than 10 points, so that there is practically no difference in the two groups due to the impairment under consideration.

A study of the deaths in the underweight group shows that 35% were due to tuberculosis, against 25% in the group of average weights.

It has been our practice to place upon the best of the cases of the sort we have attempted to describe a rating of 50 points and a higher rating upon the less desirable of them. The results show that our estimates have been conservative and we shall continue in this practice, using, as heretofore, the utmost effort to exclude those who are actually in ill health or have a well-defined tendency to disease.

Heretofore we have believed that a high mortality must surely occur among risks of this sort if, in addition, they gave a history

of tuberculosis in the family, in a parent, brother or sister. With a view to putting this to the test of experience, we have taken out all of our risks of the kind. Unfortunately, there were found to be few cases of weight group (a), so that we are able to give the results in weight group (b) only.

NOT ROBUST, PALE, ANEMIC, DELICATE-LOOKING
COMBINED WITH HISTORY OF ONE DEATH IN FAMILY FROM TUBERCULOSIS

	Number of Cases	Actual Deaths	Expected Deaths	Ratio of Actual to Expected Deaths
Underweight.....	649	65	42.8	152%

Of the deaths 50% were due to tuberculosis—a higher ratio than among the group without the family history of tuberculosis.

The family history of tuberculosis did not affect the results appreciably, evidently because of the great care which must have been exercised by both the medical examiner and the Company in the selection of these risks.

We have already referred to the fact that among these risks a heart murmur is found occasionally as a complicating factor. It seems not to be an organic lesion, but to be rather an expression of the lack of robustness, of the flabbiness of texture of these persons. The opportunity to test our experience among these risks seemed too good to be lost and, though this group is a small one, we believe it will be welcomed as the first attempt to clear up the question of the significance of heart murmurs among these fragile people.

NOT ROBUST, PALE, ANEMIC, DELICATE-LOOKING WITH HEART MURMUR USUALLY SYSTOLIC IN THE MITRAL AREA

Number of Cases	Actual Deaths	Expected Deaths	Ratio of Actual to Expected Deaths
409	27	17.1	158%

As the statistics are few in number the results must be accepted with caution and especially as great care was exercised in selection and all seriously impaired cases have been rejected.

High Systolic Blood Pressure.

Since the year 1907 we have been taking the systolic blood pressure of our applicants for insurance and have been accepting risks on underaverage plans when it materially exceeded the normal. Unfortunately, the diastolic pressures were not taken until several years later, so that we are not in position to contribute any information on that important subject. We believe, however, that this information on systolic pressure is of enough volume and probably of enough interest to justify its publication. To understand our results it is necessary to give a brief table of the average systolic pressure used by us. This is based on observations by the auscultatory method and is as follows:

Age	Average Systolic Blood Pressure
20	120 m.m.
25	122
30	123
35	124
40	126
45	128
50	130
55	132
60	135

All of the policies were issued with an advance in age. There were exposed to risk 2,838 cases, including some which showed other impairments of little moment and, so far as we could determine, not related to the high blood pressure. The expected deaths were calculated at the true age according to the M.A. (Select) Table. In the first place, a synopsis is given of the experience of cases from 10 mm. to 50 mm. above the average systolic pressure for the age.

HIGH SYSTOLIC BLOOD PRESSURE

Number of Cases	Actual Deaths	Expected Deaths	Ratio of Actual to Expected Deaths
2838	149	83.2	179%

Of the deaths 33% were due to heart disease, 15% to Bright's disease, and 15% to apoplexy.

As we do not know the blood pressure of the lowest mortality for each age, we have taken the *average* systolic pressures in preparing tables from which to measure the effect of departures from the average blood pressures.

Number of Mm. Over Average Systolic Blood Pressure for Age	Number of Cases	Actual Deaths	Expected Deaths	Ratio of Actual to Expected Deaths
+10 to +25 averaging +20	1307	50	34.2	146%
+26 to +35 averaging +30	1190	70	37.3	188
+36 to +50 averaging +40	341	29	11.7	248

As was expected, the average age at entry was high—43 against the average of 37 among our insured at date of application.

Continuing his noteworthy contributions in this field, Dr. J. W. Fisher gave us last year some very interesting tables of the mortality among risks rejected for high systolic blood pressure only, by the Northwestern Mutual Life Insurance Company. These applicants, rejected during the years 1907 to 1920, were kept under observation to the anniversaries of their rejection in 1921. The blood pressures were taken by the palpatory method, which averages about 5 mm. lower than that by the auscultatory method. The average age among these was the same (43) as among those accepted by the New York Life Insurance Co. at an advance in age. The expected deaths were calculated by the Medico-Actuarial Mortality Table. The following were the results:

RISKS REJECTED FOR HIGH SYSTOLIC BLOOD PRESSURE ONLY BY THE NORTHWESTERN MUTUAL LIFE INSURANCE CO.

Number of Mm. Over Average Systolic Blood Pressure for Age	Actual Deaths	Expected Deaths	Ratio of Actual to Expected Deaths
+10 to +24.....	151	89.4	169%
+25 to +34.....	111	55.4	200
+35 to +49.....	121	49.4	245
+50 and over.....	124	31.7	391

A comparison of these two experiences shows a reasonable agreement between them. It is true that the Northwestern's mortality ratios are on the whole somewhat higher, but this was to have been expected because they are upon rejected lives, whilst those of the New York Life rest upon selected lives, from which the less favorable risks have been excluded. We may accept this testimony as ample justification for the practice of declining such risks or of accepting them only on a substandard basis. It is very doubtful whether physicians in private practice realize the seriousness of a systolic blood pressure of 20 mm. to 30 mm. above the average and the testimony of the life companies in this field will do much to impress this truth upon them.

This study indicates that our ratings for high blood pressure, as given in a previous paper, are low and we intend to increase them to bring them more nearly into agreement with the facts now published. Such a change in our standards will probably be temporary because the result of the investigation now being undertaken by the Joint Committee on mortality, may call for other changes.

While in many of our groups compounded of two impairments the data are scanty, it seems desirable to publish the experience in as many of them as may throw any light on the subject. Three groups are of this sort. In these it would be expected that the impairment in question, plus a higher arterial tension than the normal, would show a higher mortality in combination than the sum of the separate impairments.

High Systolic Blood Pressure with Overweight

The first of these is a group of our insured about 30% above the average weight, whose abdominal girth was slightly greater than that of the chest and whose blood pressure was 25 mm. above the average:

HIGH BLOOD PRESSURE WITH OVERWEIGHT

Number of Cases	Actual Deaths	Expected Deaths	Ratio of Actual to Expected Deaths
334	28	13.3	211%

The ratings provided for the high blood pressure alone averaged 30%, and for build alone 45%, so that the mortality experienced was higher than that covered by the sum of the ratings for the separate impairments—but the material is too small to base very positive conclusions upon it.

Another of these is a high systolic blood pressure plus albumin found on examination. The following are the results:

HIGH SYSTOLIC BLOOD PRESSURE WITH ALBUMINURIA

Number of Cases	Actual Deaths	Expected Deaths	Ratio of Actual to Expected Deaths
423	26	8.9	290%

The average rating for the blood pressures alone was 30%, and for the albuminuria alone 50%—an expected *extra* mortality of 80% against an actual of 190%. While the material is not large, the results correspond with our expectation that the mortality from the two impairments would be greater than the sum of the mortalities for the individual impairments. Of the deaths there were 40% from Bright's disease.

Finally, a group to which we should like to call attention is

that of high systolic blood pressure associated with a heart murmur—mitral regurgitation—as follows:

HIGH SYSTOLIC BLOOD PRESSURE WITH MITRAL REGURGITATION

Number of Cases	Actual Deaths	Expected Deaths	Ratio of Actual to Expected Deaths
921	38	17.1	220%

The average rating for blood pressure among the foregoing cases was 25% and for the mitral regurgitation 75%, an *extra* mortality of 100%, against the extra mortality experience of 120%. The number of cases is not large and the difference between the actual and the expected for the combined impairments may be too small to justify very definite conclusions. It may be noted that more than half the deaths in this group were from heart disease.

Several of the foregoing studies deal with double impairments. It is along this line that additional information is much needed. We now have trustworthy information about most of the principal simple impairments, but the effect of two or more impairments is known still but little, except in such outstanding instances as tuberculous family history with light weight, and heart murmurs with a history of rheumatism. In most of the double impairments we base our judgment on our knowledge of the component factors. This is better than to depend upon our unaided impressions. But we should have all the light we can get regarding them and, as even the largest companies have only a comparatively small experience with double impairments, it seems justifiable to publish such material as has been used in this paper, in the hope that out of all our experience we may obtain trustworthy guides for our use in the future.

DISCUSSION

Dr. Grosvenor—Dr. Brown will open the discussion of this splendid paper.

Dr. C. T. Brown—Mr. President: Year after year the authors of this paper have contributed to the Proceedings of this Association and it is, I believe, a service for which we are extremely grateful. They have a storehouse of experience and they are giving us a wealth of knowledge and information.

The impairments under discussion seem to be described so well and the facts they give us seem to be so definite and positive that but little opportunity for discussion is offered. The description of the first group, namely, not robust, pale, anaemic and delicate looking—gives us a clear idea of this somewhat heterogeneous class. I feel that we have all been puzzled as to just what to do with risks of this sort. It would seem that the experience which these gentlemen report corresponds quite well with the clinical thought in the matter; and the relatively high proportion of deaths from tuberculosis is not surprising. I would be inclined to think that the younger ages at entry would give a worse experience than the older ages and I wonder if this class was studied by age groups and whether or not that investigation did indicate that difference.

The remarks concerning blood pressure are interesting. I think I am always astonished at the mortality experience of individuals who have blood pressure 15 mms. or 20 mms. above the average, and I feel quite sure that physicians in private practice, as a rule, do not appreciate the seriousness of this relatively slight increase in arterial tension.

The combined impairments—blood pressure with overweight, albuminuria, or heart murmur—seem to be a linking of indications of degenerative processes and one might expect that combinations of this sort would exert a geometrical rather than an arithmetical effect on mortality.

There is one question I would like to ask. My understanding is that this is an experience on substandard groups. Possibly some of the entrants into these substandard groups were later placed in more favorable classes, or were put in standard groups, and I wonder whether they were excluded or included in this investigation.

Dr. Rogers—Excluded.

Dr. Grosvenor—Dr. Hamilton will continue the discussion of this paper.

Dr. Hamilton—Mr. Chairman and Gentlemen: I regret that I have no statement to make based upon the statistics of our Company's experience, which, compared with that of Dr. Rogers's and Mr. Hunter's is so very small. The Company which these two gentlemen represent has so varied and so rich an experience from which to draw that their conclusions approach a finality.

It has occurred to me, in considering the terminology used in this grouping, that here more than elsewhere in our reports, we are wholly dependent upon our examiner's appreciation of the appearance of the applicant. An inspection of the applicant is too often neglected and when undertaken it is often done without care, hurriedly, in a poor light, and recorded in loose terms. Clinical experience teaches the great advantage of a careful general inspection, and of the value of such an inspection accurately described in life insurance I have long since been convinced. We owe much to Dr. Rogers and Mr. Hunter in their attempt to estimate the value of these rather indefinite cases.

I am in doubt as to the cardiac murmurs described in the paper just read, as to their being any more frequent in these than in any other group of cases. If Dr. Rogers has information on this point it would be most instructive, for I am not convinced that clinically they occur more frequently in the case of the thin and the anaemic. As we are in a speculative state of mind on this point as to whether thinness or anaemia or both combined, afford the conditions for producing these murmurs, it would seem as if the results of a study in wards and of life insurance records might add something to our knowledge on this point.

The blood pressure aspect of the papers is very interesting indeed. My conclusions after several years of clinical work and many reports at Head Office are that we must pay more attention to the diastolic pressure, and take more than one reading in hypertension cases. Conclusions based on but one read-

ing have been a great disadvantage to the Company as well as the proposed applicant.

Mr. Chairman, this Association is much indebted to Dr. Rogers and Mr. Hunter for their stimulating study on these doubtful and difficult groups.

Dr. Grosvenor—Will Dr. Knight continue the discussion of this paper?

Dr. A. S. Knight—The two thoughts that come to me most forcibly after reading this highly valuable paper are (1) that in it Dr. Rogers and Mr. Hunter are tackling some of the questions that, entirely aside from statistical figures and experiences, are among the most difficult of answering that Medical Directors and Medical Examiners have to meet. The writers appreciate this fact and put us on our guard about it in the apt sentences of the first paragraph which should be reread with care. They say that in those accepted as substandard risks careful examinations have failed to disclose organic diseases; that the lungs and other vital organs are sound; that such risks are stumbling blocks to medical examiners and inspectors; that the group is not homogeneous; nor may we elucidate the underlying pathology of such cases.

All this is perfectly true and it means that with our physicians of average ability and with the limited time for examinations and very limited methods that can be employed in examining applicants for life insurance, these pale, anaemic, delicate-looking people must be judged free from organic disease if they are to be accepted even as substandards. Doubtless many of them have no disease at the moment but when we consider how often the experts find X-ray evidences of decided tuberculous activity in patients who show no other physical signs of it at the time; and when we recall instances of able specialists sending patients to the Adirondacks with the diagnosis of tuberculosis and their staying there for six months under the repeated, perhaps almost daily examinations of the best experts in the country, who at the end of that time declare that the case is or is not one of tuberculosis and that the expert who sent him did or did not make a mistake; and when we

consider further how often a blood Wasserman test shows acquired or inherited syphilis in the individual who gives no history and often has no knowledge of having the disease; and when we think of what other special X-ray, blood, and chemical tests show in those individuals who take them, it is no wonder that it pulls quite a bit on our courage to select by the single limited insurance examination some of these applicants of unfavorable appearance as free from disease. The more I think about it the more I believe that these people give us just about as difficult a problem as we have in life insurance selection.

Nevertheless in spite of the difficulties the second thought that comes quickly to us after reading this paper is of the wisdom, the safety, the sound business policy of trying to correctly measure these risks even though they be substandard and of thus gaining the needed experiences by insuring them just as these able men and this progressive New York Life Insurance Company has done.

You will be interested in knowing that in our Metropolitan Life Insurance Company we now have provision for the study of the mortality experiences of our Ordinary and Intermediate applicants according to various classes of impairments. For this purpose a section has been established which prepares cards for all our issued applications and for some classes of our rejected applications (heart, blood pressure or urine abnormalities, goitre, history of tuberculosis, gastric or duodenal ulcers, etc.). A special code has been prepared to cover all of the classes of impairment, which we believe will be interesting to study. This code enables the least data from the handwritten cards to be transferred to the Hollerith Punch cards. We make current tabulations to see how often various types of impairments are found, and we look forward to a profitable opportunity in the future to study the mortality experience of our large business.

This work has been in operation for about a year only and I am, therefore, unable to give you a mortality analysis of the two classes of applicants which Dr. Rogers and Mr. Hunter

have discussed. Their report is, of course, based on tabulations and statistics that they have been carrying on for years. At this time, I can tell you only how often these two classes of impairments appear in the Metropolitan experience. We found that about 3,300 or 6 per 1,000 applicants were described by the doctor as having an unsatisfactory appearance in 1922. We issued about 40 of these in our Ordinary Department. On substandard plane, we issued about 220 cases. The rest, 3,040 in number, we declined, a rejection rate of about 92%. I suspect that these figures of ours represent just about the same proportions as do those of the New York Life, for you will notice that Dr. Rogers and Mr. Hunter tell us that in the twenty-five years from 1896 to 1921 that Company insured only 3,780 of these risks of unfavorable appearance which is an average of 151 per year. Both of our companies are, of course, writing much larger numbers of cases annually now than they did twenty years ago and thus our issue at the rate of 5,500 for the twenty-five years must be at about the same rate that Dr. Rogers' Company was issuing them in 1922. Possibly we in the Metropolitan have occasion to reject more applicants of this type than any of the other companies, except the Industrials, for the reason that our agents, who write Ordinary insurance among wage earners, are more likely to come in contact with cases of poor appearance than agents of other companies that limit themselves to Ordinary insurance alone. We have, therefore, been interested in this group for some time. Our impression is that they are not homogeneous, but that they are composed of a number of distinct types that it is difficult for the want of data to distinguish. We take only the best, but realize that even they are substandard. When we have collected our mortality experience over a number of years, we may be able to determine just how our impressions agree and whether the experience as described by Dr. Rogers is confirmed. We rather think it will be.

The comparatively few cases that we have to report on show characteristics like those described by Dr. Rogers and Mr. Hunter. We had a few which showed systolic murmurs and

a few cases with a family history of tuberculosis. Among our accepted cases there were 50% more underweight as compared with 300% in the New York Life experiences. The difference was not due to our selection because even among the rejected cases, the number of underweights was only about one-third greater than the number of persons showing normal weight.

Over 8,000 of our applicants in 1922 showed a high systolic blood pressure, that is 140 m.m. or over. Such cases were found in about 16 out of every 1,000 applicants. The proportion is low because the blood pressures were taken only on applicants for Whole Life policies, or for $15,000 or more irrespective of age, or for $5,000 or more when the age is over 45. In our Ordinary Department, we issued about 3,300 or 1.3 per cent. cases, whose blood pressure ranged from 140 to 150 m.m., and a few cases which showed as much as 150 to 155 m.m. systolic blood pressure. Among our substandard insurance, we issued about 725 applications, whose blood pressure ranged from 140 to 160 m.m. Some of these also showed overweight, a slight heart impairment or a few other minor impairments. The rest we rejected.

It may be of interest for you to know that during the last year, Dr. Dublin, our Statistician, has been able to make a study of the blood pressures in a group of 17,000 white male Ordinary policyholders, to determine the association of high or low blood pressure with other physical impairments. This study has disclosed that high blood pressure is pretty generally associated with overweight. On the other hand, there is next to no association with a high protein diet or the use of tobacco or of tea or coffee. Suspected focal infection in the tonsils showed no larger association than the absence of such infection. Likewise, persons with heavy dentistry showed no more important departures in arterial tension than did those which had no heavy dentistry. In fact, we could find no single item either of structure or of habit which would definitely be associated with the existence of high blood pressure.

I am sure that we are all very grateful to Dr. Rogers and to Mr. Hunter for this further addition from them to our definite

knowledge of medical selection problems and of their correct solutions.

Dr. Fisher—I would like to call Dr. Rogers' attention to just one point where he compares the Northwestern with the New York Life data. He says it is true that the Northwestern mortality ratios are on the whole somewhat higher, but this was to have been expected because they are upon rejected lives but those of the New York Life rest upon selected lives from which the less favorable risks have been excluded.

The Northwestern's statistics which the Committee gave to you in 1922 were based upon lives that we would have accepted had it not been for the blood pressure. We have taken no statistics on the blood pressure records where there was any other impairment even an excessive weight, because we found that the mortality of that class was 50% to 60% higher than the class where there was no other impairment. So it seems to me that should be corrected with regard to the class of risks. Our reason for declining them was due wholly to the blood pressure. We would have accepted all of these risks had it not been for the blood pressure.

Dr. Rogers—With regard to Dr. Fisher's point, there was no intention on Mr. Hunter's part and mine to imply that the Northwestern's rejected risks were any less well selected in their way than were our accepted risks. They were rejected. Ours were accepted. The difference may lie largely in the psychology of the people upon whom that operation was performed. Years ago in our own experience, we found the mortalities based on our rejected lives, however carefully selected, were higher than those on lives of the same kind accepted for insurance. We have seen that often enough to feel we cannot place rejected lives on all fours with accepted lives, without making some allowance for that fact. Have I made that point clear?

Dr. Fisher—I do not quite agree with it.

Dr. Rogers—To my mind the parallelism and the inherent agreement between Dr. Fisher's findings and ours is quite striking. Further, Mr. Hunter thinks that at least a partial explana-

tion of these small differences may lie in the circumstance that the observations made upon the Northwestern material were by the palpatory method, whilst we have been following the auscultatory, and also in part by another circumstance, namely, that the great bulk of the observations of blood pressure are rather apt to be at the zero or five of the first digit and that there may be between the Northwestern figures and ours just enough variation in that respect to contribute somewhat to the rather small difference between us. In other words, a blood pressure is rather apt to be stated by an examiner as 180 m.m. or 185 m.m. and not to be stated at one of the intervening digits, say 183 m.m. If examiners follow fairly closely the terminal figures zero or five, then the critical number in Dr. Fisher's studies passes over in each case into the next blood pressure group and this would tend to increase the mortality ratios derived from the figures. At any rate and whatever the causes that contribute to these differences, Mr. Hunter and I are of the opinion that there is certainly a very "reasonable agreement" between the experience of the Northwestern and that of the New York Life, when you consider that one of them rests on standard lives and the other upon rejected lives and also that the blood pressure readings were taken under somewhat different conditions.

Dr. Hamilton raises the question whether heart murmurs are more common among these fragile people. I am unable to say. Many years ago, before we went into the substandard field, about 12½% of our rejections were due to heart murmurs. I am unable to say how many of these "not robust people" had heart murmurs, but only the number of them which accepted the insurance offered them. These you will see amount to slightly less than 12%.

As to the "fragile", the "not robust" group, as we said in our paper, there is nothing more puzzling in life insurance than to know what to do with them. The picture I get in my mind about them is that they lack vitality, lack stamina and indeed, are on the borderline between people that are healthy and those that are not healthy. There is not a thing the matter with them

and yet they do not present the appearance of really good health. I think it is an interesting group in that, looking at them as we did, we were able to secure among them just about the mortality we predicted.

Dr. Grosvenor—It gives me a great deal of pleasure to introduce to the Association, Dr. W. W. Graves, of St. Louis, Mo. Dr. Graves has worked for a number of years on what might be called a morphological hypothesis with regard to the stamina of the race in certain individuals, and I think it will be of interest to hear what he has to say on the subject of "Age Incidence of Scapular Types."

THE AGE INCIDENCE OF SCAPULAR TYPES: ITS POSSIBLE RELATION TO LONGEVITY

By William Washington Graves

Prof. Neuro-Psychiatry, St. Louis University School of Medicine, St. Louis

Mr. President and Gentlemen:

Permit me to express the keenest appreciation of the very great honor conferred by the invitation to address the Association of Life Insurance Medical Directors.

Life insurance is more than a mere business because it promotes health, thrift, good citizenship and love of home, of wife and child. It is truly beneficent in its purposes. In recent years it has become one of the most useful institutions of our civilization. And standing at its very portals is the Department of the Medical Director, safeguarding alike the interest of the institution and of the policy-holder, when it endeavors, through the use of accumulated medical knowledge, to differentiate between relative health and actual or potential disease. It seems to me that the Life Insurance Medical Director must necessarily be not only a clinician of

unusual training and judgment, but he must also be one trained in actuarial and statistical methods.

Since I have had the opportunity of glancing through the transactions of your Association, I have been impressed, as never before, with the usefulness of statistical methods in furthering the solution of many clinical problems and particularly those relating to the vital problems of health and disease or the social and economic welfare of the individual and the race.

Untrained, as I am, in actuarial and statistical methods, I can speak only as a clinician; hence must ask your charitable indulgence in considering the all too meager statistical data to follow. Nevertheless, your constructive criticism is desired and, if may be, your interest in furthering the solution of certain intricate, yet very practical problems intimately associated with the structural constitution of man. It is to one of these problems that I have the honor of directing your attention while we consider together some observations, investigations and figures illustrating the age incidence of scapular types in its relation to longevity.

"Life is short and the Art long; the Occasion fleeting; Experience fallacious and Judgment difficult." "It is the business of the physician to know, in the first place, things similar and things dissimilar." Thus spoke the Father of Medicine.

Human experience teaches that like tends to beget like in the propagation of plants and animals. Yet no two individuals are exactly alike. Resemblances, similarities and differences are found among the individuals of any species, but Nature has produced among them no duplicates. Each individual is truly the first and last of his particular kind. However close may be the kinship of individual A and individual B, they are never equal in their natural endowments. A is always more or less competent than B in structure and function; always more or less competent than B in capacity for adaptation. The relations of structure, function and environment are so close that we cannot think of the one without the others. Structures and functions in their combined and reciprocal relations make up

the individual organism, and it is with these that it struggles for existence, adapts itself excellently, well or poorly to an ever-varying environment, during measurable time, and finally perishes. Because no two human beings are alike; because they differ in natural endowments and consequently in structures, functions, acquirements and total makeup; because they differ in their innate capacities for adaptation, the individual is a fundamental and universal problem.

Every-day observations reveal structural and functional differences, similarities and inequalities in individuals of any species, and this is especially true of the human. Even as physicians, we do not always seem to realize, as fully as we might, that such of these as are inherited may be utilized as *conditional indices* of the individual's adaptability, of his capacities for health, of his resistance or vulnerability to disease, in the broadest sense, or even of his few or many years of life. Among the inherited differences, similarities and inequalities abounding in the structures of the human species and among those easily recognized in the living are certain variations of the shoulder blade.

The scapula is one of the distinctive bones of the body and is composed of many and various characteristics. Prior to my investigations, which began in 1906, it had received comparatively little consideration by anatomists, anthropologists and clinicians. As a bone of unusual functional importance, it had received far less consideration than that given to many other bones. Nevertheless, its general form and some of its special features had been accurately described; its relation with muscles and contiguous bones and its vascular and nerve supply investigated; its range in variation considered and emphasized [Broca (43), Mivart (42), Turner (46), Dwight (47)]; some racial and sex differences pointed out [Broca (43), Livon (44), Dorsey (50), Flower (45)]; its comparative anatomy, particularly in relation to some primates investigated [Mivart (42), Turner (46), Dwight (47), Ranke (51), Schuck (52)]; some of its indices established [Broca (43), Martin (78)], and its growth from foetal to adult life, more or

less, worked out, but a scapula was still a scapula. It was merely one among many bones of the body, and aside from its importance to proper function of the shoulder girdle and upper extremities, it had attained no particular significance. No one prior to my investigations, as far as I know, had made comparative studies of the many and varying characteristics of human scapulae and classified them into types. Let me briefly recall the initial observation which led to the classification of human scapulae into easily-recognized types in living, skeletal and foetal material, which classification has served as a basis for all subsequent investigations by myself and many others, then summarize the results of my studies fundamental to an appreciation of the relation of the age incidence of scapular types to longevity.

Observation I.....the R1 family. On Sept. 18, 1906, while making a routine physical examination in the Neurological Clinic of the St. Louis University School of Medicine of a seven-year-old boy, I was impressed with the peculiar contour of the vertebral borders of his shoulder blades. Each vertebral border was distinctly concave from the mergence of the spine of the scapula with the vertebral border to a point slightly above the inferior angle of the bone. These borders and the inferior angles of the scapulae stood out prominently, wing-like. The vertebral borders were far apart and their general course paralleled the spinal axis. The boy's neck appeared unusually long. His shoulders were hanging, drooping downward and forward, and the right was lower than the left. The thorax was well formed, though shallow and somewhat narrowed about the lower costo-sternal junction. The clavicles took a distinctly horizontal course, the abdomen was unduly prominent about its lower half and the body attitudes were those of extreme sluggishness. His stature and weight were much less than the average and his muscle development was meager, without evidence of atrophy. He was able to assume normal attitudes, to elevate and approximate his shoulder blades in a proper manner and to execute all movements with forcefulness proportionate to his muscular

development. On examination of the entire family, the mother, age 39, showed similar physical makeup, but the vertebral borders of her scapulae were even more markedly concave than those of the patient. The father, age 43, represented good physical development. The vertebral borders of his scapulae were convex, while those of the younger children—a boy 5 and a girl 3 years—were as concave as those of the older boy, and they, like him and the mother, disclosed rather poor general development.

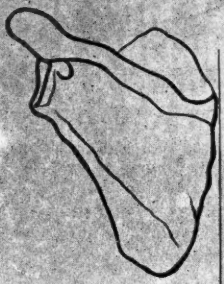
Since the vertebral border of the human scapula had been described, and usually so pictured in all modern text-books on human anatomy, as having a more or less convex outline similar to that found in the father of the R1 family, the finding of concave vertebral borders, in the mother and her 3 children associated with general defective development, naturally led to further studies of scapular-vertebral-border formation and of coexistent variations in individuals and in the individuals of families and to comparative studies of skeletal and of foetal scapulae. These studies soon revealed the existence of a limited range in variation of scapular vertebral borders—from markedly convex to markedly concave. In some individuals, I found markedly, in some moderately, in some slightly concave vertebral borders; in some markedly, moderately or slightly convex vertebral borders; in others vertebral borders with contour neither convex nor concave but intermediate in contour seemingly straight or nearly so. Comparative studies of living and similar studies of skeletal and foetal material have led me to classify human scapulae into *convex, straight* and *concave* types (Plts. I & II). This classification is based upon the relation of a straight line to the greater portion of the vertebral border below the scapular spine, but fundamentally it is based upon a combination of the anatomical and architectural features peculiar to each type. In my first communication in 1910, I pointed out 5 or more features common to straight and concave types (1). That study was based on only 198 mature skeletal scapulae, of which 61% were convex, 26% straight and 13% concave. In a comparative study of a much larger mate-

GRAVES'

SCAPULAR CLASSIFICATION CONVEX-STRAIGHT-CONCAVE

BASED PRIMARILY ON CHARACTER OF GREATER PORTION OF VERTEBRAL-BORDER CONTOUR BELOW SCAPULAR SPINE.

A



THE **CONVEX** TYPE: MAY BE REGULARLY OR IRREGULARLY, SLIGHTLY: Cv.1, MODERATELY: Cv.2, OR MARKEDLY: Cv.3 CONVEX.

B

THE **STRAIGHT** TYPE: STRAIGHT OR NEARLY SO, NEITHER CONVEX NOR CONCAVE, TENDING RATHER TO CONCAVITY THAN TO CONVEXITY.

C

THE **CONCAVE** TYPE: MAY BE REGULARLY OR IRREGULARLY, SLIGHTLY: Cc1, MODERATELY: Cc2, OR MARKEDLY: Cc3 CONCAVE.

THE **SCAPHOID** TYPE COMBINES 12 OR MORE ANATOMICAL AND ARCHITECTURAL FEATURES COMMON TO SRAIGHT AND CONCAVE WHICH CONTRAST VIVIDLY WITH SIMILAR FEATURES IN THE CONVEX.

GRAVES: AM. J. PHYS. ANTHRO. VOL. IV. NO. 2 1921.

Plate 1. Outline drawings (P. A. Conrath) from mature human scapulae: A—Convex "Cv2" Type; B—Straight "St" (Scaphoid) Type, and C—Concave "Cc3" (Scaphoid) Type.

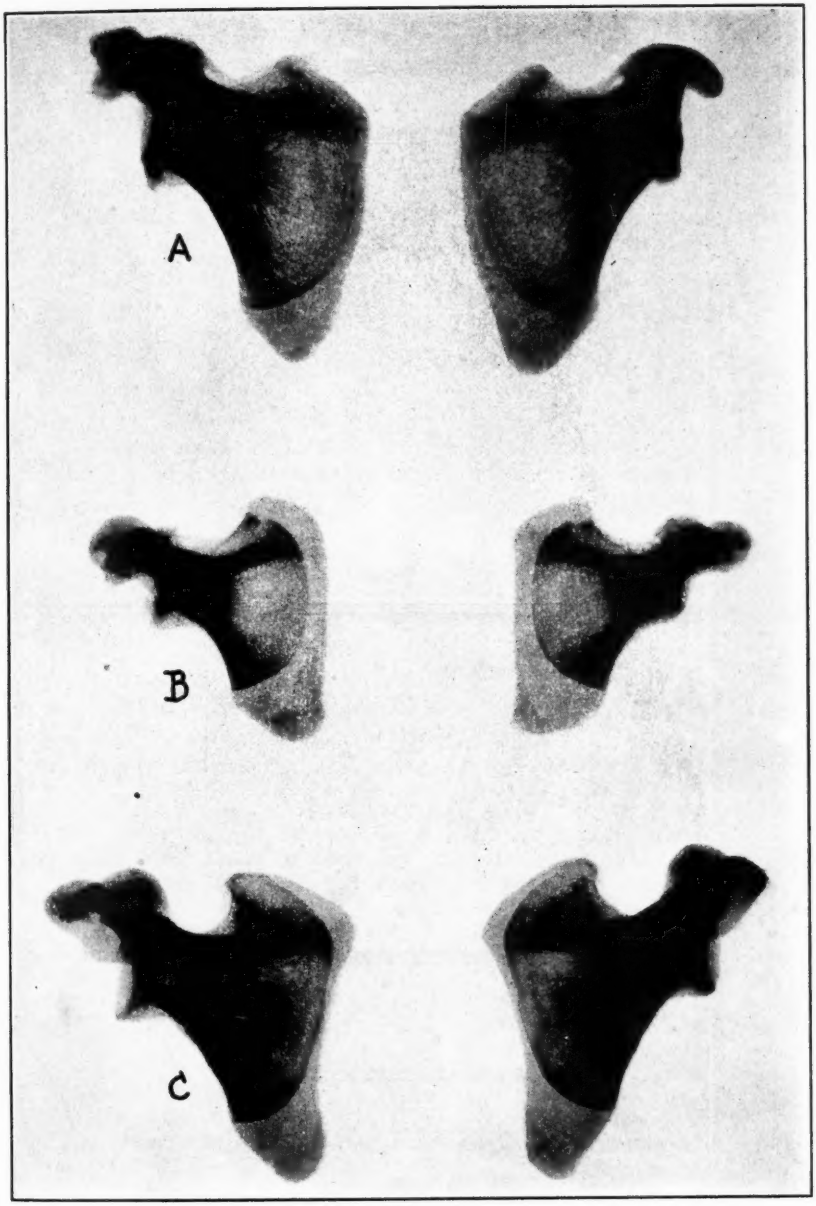


Plate II. Roentgenograms (P. F. Titterington): A—Full Term, Convex "Cv2" Type: B—7½ Months Gestation, Straight "St" (Scaphoid) Type, and C—Full Term, Concave "Cc3" (Scaphoid) Type. Note the relation of the ossifying plate to the still cartilaginous superior border and angle, the inferior border and angle and the entire vertebral-border regions.

rial consisting of 1,219 mature bones, it has been clearly shown that the *concave* and the *straight* have 12 or more features in common, and, therefore, constitute a variant type contrasting vividly with the convex (11)*. These comparative studies have justified me in combining the straight and concave forms, and in designating them the *scaphoid type of scapula* (Plate I). Further justification was found in the fact that individuals in whom the vertebral border was classified straight often disclosed characteristics similar to, although, as a rule, less marked than in those in whom it was found to be concave.

Because the scaphoid (concave or straight) was found with relative frequence in all periods of life; because more or less convexity of the vertebral border had been considered by anatomists a characteristic of the so-called "normal" or "average" scapula in man; and because mammalian families below man, as a rule, disclosed more or less convex scapular vertebral borders, I formerly considered the scaphoid type an anomaly in development, and I have in my writings repeatedly referred to it as such. Further investigations of living and skeletal material of man and of vertebrate skeletal material in general, and a better appreciation of the range of variation in the various

*The chief characters common to the *straight* and *concave* types contrasting with similar characters in the *convex* are as follows: (1) Thickness of the vertebral border; (2) "Vertebral-border buds" or processes varying in location, size and number; (3) "Vertebral-border remnants": meaning a part of the vertebral-border system (lips and intermediary surface) morphologically more or less complete; (4) Three scapular indices: Broca's Scapular-and Infra- spinous Indices and Hrdlicka's Index; (5) The degree of angle formed by the long scapular axis with the general direction of the scapular spine; (6) The relation of the vertebral border below the scapular spine to a straight edge; (7) The relation of the inferior border to a horizontal or to a vertical when the long scapular axis is vertical; (8) The relation of the Teres major process to axillary border; (9) The relation of the long axis of glenoid to long scapular axis; (10) The character of the inferior-angle region; (11) The densities of the bones to transmitted light; (12) The densities of the bones to the x-ray; (13) Muscle markings of bones in approximately the same age periods; (14) Weight of bones having similar long axis measurements in approximately the same age periods.

structures and functions in man's total makeup, have convinced me that it is erroneous to consider the scaphoid type (concave or straight) *an anomaly in development.* It would be equally *valid* to consider the *convex* an anomaly for the reason that each scapular type (convex, straight or concave) is fundamentally a combination of morphologic and architectural features peculiar to the human scapula.

Observations on living and skeletal material from birth to old age show the presence of convex, straight and concave scapular types in all periods of life in varying degrees and percentages.

Dissections of foetal scapulae in approximately the tenth week of development (when the human scapula is mainly cartilaginous) and onward in prenatal life, show convex, straight and concave types.

Observations on the living in our population, regardless of age, sex, race, stock, environment, occupation, social level, health, disease, type or build, show the presence of convex, straight and concave scapular types in varying degrees and percentages.

Observations on approximately 3,500 skeletal scapulae representing the several races of man, beginning with modern and going back as far as pre-dynastic Egyptian, show the presence of convex, straight and concave scapular types in all races thus far investigated. Moreover, similar scapular types are found in several mammalian families below man, and particularly in the orang, gorilla and chimpanzee (11).

The number and percentages of convex, straight and concave scapular types, from mixed-stock dissecting-room material in 1,219 mature bones, whose bearers ranged in years from —25 to 96+ with an average age of approximately 50 years were found to be as follows:

	Mature Bones	Percentages
Convex.....	663	54.3
Straight.....	320	26.2
Concave.....	236	19.5

The scapulae of ancient man thus far found in sufficient numbers with unknown average age when classified yielded the following numbers and percentages:

XII to XX Dynasty Egyptians (U. S. National Museum)

	Mature Bones	Percentages
Convex	20	44.4
Straight	13	28.8
Concave	12	26.8

Pre-Columbian Peruvian Indians (U. S. National Museum)

	Mature Bones	Percentages
Convex	32	66.6
Straight	11	22.9
Concave	5	10.5

Pre-White Pueblo Indians (U. S. National Museum)

	Mature Bones	Percentages
Convex	77	69.3%
Straight	22	19.8%
Concave	12	10.9%

Both the presence and percentages of the three scapular types in the remains of ancient and modern man justify the inference that all races of man at all times have possessed similar scapular variations and types and that the origin of scapular types in man is primal. The finding of identical scapular types in prenatal life and in all subsequent periods of life and the finding of similar scapular types in mammals below man further justifies this inference.

Positive proof of the primal, or germ-plasm origin of scapular types is found in comparative studies of families through as many generations as possible. The observations on the R1 family clearly indicated the origin of scapular types in the

mechanisms of heredity, and one need only examine the members of one's own family to find indubitable evidence of their hereditary nature. Comparative studies of families, through 2, 3, 4 and 5 generations show that scapular types are definitely transmitted from parent to child through successive generations (1). Such studies in direct and collateral lines of ascent and descent lead me to the conclusion that in no single morphologic or functional trait or characteristic of human inheritance (except racial) do the progeny more frequently and more closely resemble each other and also one or both parents than in shoulder-blade types. The only exceptions to this rule thus far found are an occasional example of *atavism* and the occasional finding of some *disease factor* like syphilis in both parents. Under such abnormal circumstances (disease factor in both parents), the progeny may have a type different from that found in both parents. In general, I may say, that under normal circumstances (no disease factor) the transmission of scapular types from parent to progeny, with but few exceptions, will be found to be as follows: Similar scapular-type matings produce similar scapular-types in the progeny; dissimilar scapular-type matings produce scaphoid types (concave or straight, in the progeny. Remembering the possible degree of variation in vertebral-border-contour formation in scapular-type matings, the resultant scapular types in the progeny seem to be examples of *blending* rather than of *mendelian* inheritance. The finding of any scapular type, convex, straight or concave, in any individual, justifies the inference that it is innate with him, normal to him and is, therefore, a part of his germ-plasm inheritance, even though this occasionally be altered by disease (toxines) and possibly by other poisons.*

*I have found thus far no disease or other poison than syphilis seemingly capable of altering scapular-type inheritance, but the frequency of such alteration is practically negligible when compared with the frequency of normal (unaltered) scapular-type inheritance. Several workers, notably Draeseke (18), Reye (17), Cunningham (20), Warburg (27), Brückner (25), Hosteing (26) and Balli (35) have misconstrued my writings to mean that syphilis is the *only* cause of the scaphoid type and that it is a *sign* of syphilis. No assumptions could be further from

If scapular types had no greater usefulness than in their application to studies of human inheritance, their biologic worth would seem to be considerable, but they appear to have far greater usefulness as conditional morphologic indices of the constitution of man, of races and of individuals. Let me here say *that scapular types are not yard-sticks with which we may measure man, any of his structures, any of his functions.* Their worth as conditional morphologic indices is found not only in the variations associated with them but also in utilizing them as bases for correlating these variations. Studies of families, of groups and of individuals cause me to say that thus far we have found no bases for correlating inherited variations of structure, function and total makeup equal in usefulness to scapular types. I can here, in passing, only give a common-place illustration of their possible worth as conditional morphologic indices.

Every-day observations reveal biologic inequalities—variations in structure, function, total makeup and fitness in human beings—but we have thus far found no standard, better than the ascendants and collaterals, for measuring such inequalities, nor are we likely to do so. The useful *averages* and *means* derived from exact measurements often utterly fail us when we apply them to the individual. The manifestations of life

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the truth, although I have for good reasons often emphasized syphilis as *just one abnormal circumstance* that does alter scapular-type inheritance (1, 2, 3, 4, 5, 6, 7). Whether this disease in both parents having convex scapulae does alter scapular-type inheritance in their progeny can be determined only by comparative clinical studies of all such syphilitic parents and their progeny. Altered scapular-type inheritance will be found in the progeny of some such families, but by no means in all. As yet we have found no way of learning the number of syphilitic parents in our population, nor the frequency with which syphilis or other poisons *do* or *may* alter human inheritance. Nevertheless, comparative studies of *fragments* of approximately 1,000 families in reference to scapular-type matings and to the possibility of finding either *normal* or *altered* scapular-type inheritance in their progeny, cause me to say that when families are chosen at random syphilis probably alters scapular-type inheritance in the progeny in less than 1/10th of one per cent of *convex* scapular-type matings.

in him refuse to be standardized, however exact our measurements may be. Even without the aid of these, we instinctively visualize the *ideal in man's make-up,* but we can neither *measure nor standardize that* ideal. Can we not, nevertheless, define the attributes of *a practical ideal* in the total make-up of man, and if so, can we not utilize these attributes in estimating human biologic inequalities? I believe we can and, consciously or not, do *define* and *utilize* them in our daily contacts, when we classify human beings into the *weak* and the *strong* and into *excellent, good* and *poor* types, etc., etc.

The *attributes* of the *ideal* in man's total make-up appear to be *symmetry, proportion, harmony* and *adaptation* of structures and functions in an ever-varying *environment*: the *same* in human beings as in all living things. Now a consideration of these attributes, when applied to the study of the whole individual, will usually enable us to discern his *nearness to,* or *remoteness from,* such an ideal in total make-up. The individual posseessing to a good degree these attributes discloses the "healthy mind in the healthy body," and he is quickly recognized as belonging to the better types of the race. As physicians we seldom come in contact with these types in a professional way—with the near-to-the-ideal in total make-up—because the symmetry, the proportion, the harmony and the adaptation of their structures and functions seem to supply them with those peculiar qualities which enable them to adapt themselves well to their environment, to resist disease, to survive and, may be, to attain long life. Our problems deal mainly with those who disclose definite *asymmetry, disproportion, disharmony* and more or less *defective adaptation* of structures and functions. It is often in these that the *soil* for development of various and manifold disease processes is found. It is mainly these who fill to overflowing our penitentiaries, our houses of correction, our special colonies, our alms houses, our hospitals and our offices. Disease in the broadest sense, in many of these seems to be expected, so great is their susceptibility and so marked is their vulnerability to its processes. They seldom adapt themselves well to their environment.

Their resistance to disease, in the broadest sense, is often poor. Many of them succumb early in life and proportionately few of them attain even relatively long life. Comparative studies of families, of groups and of individuals cause me to say that it is in those who are found to be *innately more or less remote* from an easily-recognized ideal in total make-up—the weak, the unhealthy, the plus potentially unhealthy—that the *scaphoid type of scapula* is most frequently found; conversely, that it is in those who are found to be *innately nearer* to an easily-recognized ideal in total make-up—the strong, the healthy, the plus potentially healthy of the race that the *convex type of scapula* is most frequently found. Therefore, it is not the particular type of scapula an individual may possess but it is the number and degree of variations coexistent with it that must determine the possible worth of scapular types as conditional morphologic indices of the constitution of man, of races, of individuals and of human adaptability in general.

Let us now direct our attention to findings as yet unparalleled in human morphology in which exist *a possible relation* to longevity—*the age incidence of scapular types.* Very early in my comparative studies of living individuals, I learned that the scaphoid type (concave or straight) was an unusually frequent finding in childhood and in the relatively young, and that the convex was comparatively an infrequent finding in the same age periods. These findings, at that time, appeared to be of such import that I have always refrained from giving to them that degree of emphasis which, after 17 years of observation and research, now seems to be justified. "That the scaphoid scapular occurs with great frequency among the young, but is relatively infrequent among the old," was a statement made by me in a publication in 1911 (3). This statement was based upon the observations that each scapular type disclosed an age incidence, i.e., the convex increased; whereas, the straight, like the concave, decreased in frequency of occurrence with each successive age period, from birth to old age, when relatively large groups of individuals, representing each successive age period, were investigated. Personal investigations in the

course of years indicate that in mixed-white stocks represented in our population, in the first 10 years of life, approximately 80% of the individuals are the possessors of *the scaphoid,* and approximately only 20% are the possessors of the *convex;* whereas, in the age period between 70 and 80 years approximately *only* 20% are *now* the possessors of the *scaphoid* and approximately 80% are *now* the possessors of the *convex.* A number of independent, rather extensive studies by investigators in different parts of the world, have been made in reference to the percentages of convex, straight and concave scapular types, which combined cover the several decenniums of life in the living and the dead. Some of these have been published and others communicated. The results of the studies wherein the investigators fully appreciated either the classification, or the age incidence of scapular types, or both, are arranged in tabular form and are now before you.

Table Illustrating the Age Incidence of Scapular Types Represented in Pre- and Post- Natal Periods of Life

Observer and Material	Age Period	Number of Persons	"Convex" %	"Straight" %	"Concave" %	"Straight" + "Concave" = "Scapho" Type
†Graves (W. W.) Pre-Natal life, Male & Female (white), Private collection	Approx. 10 weeks to 9 months incl.	100	26.0	49.0	25.0	74.0
Graves (W. W.), St. Louis Health Show, Male & Female (white)	3 mo. to 67 mo. incl.	422	18.0	56.0	26.0	82.0
††Graves (W. W.), Dissecting-room, Male & Female (mixed stock) various sources	50 approx. average age	1219	54.3	27.0	18.7	45.7
Warburg (F), Cologne Public School (white) Male & Female (27)	6–7 incl.	1000	12.6 ?	62.3 ?	25.1	87.9 ?

Observer and Material	Age, Period	Number of Persons	"Convex," %	"Straight," %	"Concave," %	"Straight" + "Concave" = "Scapho" Type
*Weiss (W), St. Louis Public School (white) Male & Female	5–15 incl.	5325	18.5	29.7 ?	51.8 ?	81.5
Graves (W. W.), Orphan Asylum (white) (approx. 30% of No-Retarded) Male	5–14 incl.	300	11.8	35.2	54.0	89.2
Graves (W. W.), Combined, St. Louis Infirmary, City Hospital and Masonic Home (white), M.& F.	40–50	167	54.1	27.4	18.5	45.9
	50–60	174	61.6	24.1	14.3	38.4
	60–70	275	70.0	20.3	9.7	30.0
	70–80	268	81.4	12.7	5.9	18.6
	80–90+	116	88.6	8.3	3.1	12.4
Graves (W. W.); Dissecting-room, Male & Female (white), Dept. of Anatomy Western Reserve University	20–30	45	42.2	33.3	24.5	57.8
	30–40	105	53.3	26.6	20.1	46.7
	40–50	129	60.1	23.2	16.7	39.9
	50–60	88	59.1	26.1	14.8	40.9
	60–70	63	76.2	17.4	6.4	23.8
	70–90	28	82.1	14.3	3.6	17.9
Kollert (V), Autopsies, Institute of Pathological Anatomy, Vienna, Austria, Male & Female (15)	0–10	368	38.6	34.5	26.9	61.4
	10–20	46	30.4	21.7	47.9	69.6
	20–30	125	53.6	25.6	20.8	46.4
	30–40	116	63.8	21.6	14.6	36.2
	40–50	123	74.8	22.1	3.1	25.2
	50–60	130	75.4	15.4	9.2	24.6
	60–70	58	72.5	22.4	5.0	27.5
	70–90	34	88.2	8.9	2.9	11.8
Ball and Thomas, Prostitutes (white), California (30)	20–34+	270	18	20	62	82
Cunningham (R), University students, California (white), Male & Female (20)	16–25	1057	28	15 ?	57 ?	72
*Butts (Heber), U.S.N. and M. C., Officers and enlisted men (white), 1913	20–30+	500	67.2	14.4	18.4	32.8

Observer and Material	Age, Period	Number of Persons	"Convex," %	"Straight," %	"Concave," %	"Straight" + "Concave" = "Scapho" Type
*Ball (J. D.), U. S. Army Officers in Training (1918)	20–30	976	47.6	23.2	29.2	52.4
	30–40	472	54.9	17.6	27.5	45.1
*Ball (J. D.), U. S. Army Returned Overseas men, 1919	20–30	2738	49.5	37.3	13.2	50.5
	30–40	779	67.3	24.6	8.1	32.7
*Weaver (A. C.), U. S. Army Hospitalized men, St. Louis	20–33 incl.	939	46.2	18.6	35.2	53.8
*Mackey (D.E.), Tabulated from X-ray Plates U. S. Army Hospitalized men, Army Med. School	18–30 incl.	1000	40.6	35.6	23.8	59.4
*Krause (I. B.) and Howard (S. P.), Missouri State Prison (white) (41)	20–40	381	21.0	45.4	33.6	79.0
	40–72	59	30.7	37.7	31.6	69.3

Note: Included in the period 20-40 years are 43 persons under 20, as follows: 1 at 16; 6 at 17; 14 at 18 and 22 at 19 years. In the period 30-72 years: 85 persons are between 30 and 40; 42 between 40 and 50; 9 between 50 and 60; and 8 between 60 and 72. The tabulation represents the first returns from a survey of the entire prison population, numbering approximately 2,500 persons.

*Personally communicated.

†The collection consists at this time of approximately 400 specimens and the tabulation represents the result of the first hundred examined. The sources of the collection were both local and general but mainly general, in response to an appeal for foetal material published in the Jour. A. M. A. (9) and other American Journals in 1919.

††The average age of dissecting-room material was approximated: (1) from data on 1009 bodies, supplied by Dr. Ales Hrdlicka and acquired by him in the Anatomical Department, Columbia University (Prof. George S. Huntington) and (2) from data supplied by Dr. D. M. Shoemaker, St. Louis, on 750 bodies distributed to the Medical Schools in

The table contains the classification of 100 foetal scapular forms from approximately the 8th week to the 9th month of gestation (†), and the classification of 1,219 mature skeletal scapulae whose bearers were of an approximate average age of 50 years (††). Represented in this table in living, post-mortem, foetal and skeletal material are 20,005 observations; of these 2,772 represent the dead and 17,233 the living. In spite of the personal equation that must always be reckoned with in such investigations, the figures in the table for a given age period from various sources show striking similarities. Extended comment on the investigations therein represented is at this time unnecessary; the figures speak for themselves. The figures illustrate the age incidence of scapular types in each succeeding age period of life, the gradual *decrease* in percentages of the *scaphoid* (straight and concave) and the gradual *increase* in percentages of the convex in successive decenniums, and they supply an additional biologic reason for combining the straight and concave into a single type—*the scaphoid*. Moreover, the figures justify the authors of text-books on

Missouri, in a recent three-year period. The range in years of the Missouri material was from 28 to 92: the average age 54.6 years, and that from Columbia University from 15 to 96: average age 46-8 years. Represented in the tabulation are 198 bones classified in the Departments of Anatomy, St. Louis University School of Medicine and Washington University Medical School; 150 bones in Department of Anatomy, University of Berlin; 602 bones in the Wistar Institute of Anatomy and Biology and 269 bones in the U. S. National Museum (Huntington Collection); total 1219 bones with approximate average age of bearers of 50 years. The following table recently compiled by Prof. T. Wingate Todd, Western Reserve University here published with his permission, gives the first exact information on minimum, maximum and average age of White and Negro male and White and Negro female dissecting-room material:

	No. of Skeletons	Min.	Max.	Average
Male white	564	18	88	48.9
Female white	74	16	80	42.8
Male Negro	178	17	70	35.7
Female Negro	44	16	87	38.7
Total	860	16	88	43.6

human anatomy in describing and picturing the scapular-vertebral border as more or less *convex,* because the figures show that the convex type is *still* the *predominating* type in *living* and *anatomical* material in our population after the fifth decennium of life, which decennium represents the *average age* of anatomical material. I would especially call your attention to the large number of the scaphoid type found by Warburg (27), (Cologne, Germany), in public-school children, in an age period between 6 and 7 years, and also to the equally large number, considering the age incidence, in the extensive study made by Weiss (*) on public-school children in St. Louis; to the relatively large number of scaphoids in university students in the study of Cunningham (20) and to a comparison of the figures in that study with those of Ball and Thomas (30) on prostitutes in the same territory, which show a larger number of scaphoids even at a greater age period. Particularly would I call your attention to the splendid investigations of Ball (6) on officers in training and returned overseas men; of Butts (*) on U. S. Navy and Marine Corps officers and men; of Weaver (*) on hospitalized returned overseas men; and of Mackey (*) on x-ray plates from U. S. A. ex-service men. The groups found in the work of Ball, Butts, Weaver and Mackey have this in common, that they represent the most rigid selection by physical and mental tests of the Army and Navy. Weaver's and Mackey's groups of hospitalized men show a larger percentage of scaphoids than the groups of Ball and Butts for approximately the same age periods. In this connection, the Army and Navy groups lend themselves to comparison with the Prison group in the study of Krause and Howard (*). I would call your especial attention to the remarkable study of Kollert (15) on 1,000 autopsies, from birth to old age. Finally let me call your attention to the seemingly more rapid decrease of the *concave* type when compared with the *straight* in the successive age periods given in the table. I shall not further comment at this time on the figures, other than to say that they are *meager,* indeed, when compared with their *possible* significance. They show just what they are

intended to show, beyond all cavil or doubt, *that each scapular type has an age incidence.* The figures merely establish that fact, but they do not explain it.

From the time of my earliest appreciation of the singular findings, that each scapular type is correlated with age, I have sought an explanation of that fact. Two possible explanations have been constantly in mind: A—That the *scaphoid* changes, in most individuals, during the course of years into the *convex* type; B—That the *scaphoid,* during the course of years, does not change into the *convex;* therefore the scaphoid is more often found than the convex in the inherently weakened, the unduly disease susceptible, the shorter-lived individuals of the race. These possible explanations have caused me to seek evidence in various directions, but I cannot here give details of my investigations. I must, however, mention their scope and the results and briefly comment on them.

I have thus far investigated the origin or causation of scapular types by studying the comparative anatomy of the scapula and other bones and by considering the literature on comparative anatomy; I have studied the morphology of human scapulae in pre- and post-natal periods of growth from the 8th week in development to the 25th year of life, and I have also studied the morphology of scapulae in several mammalian families below man, represented in pre- and post-natal life periods; I have made and observed special dissections of the muscles in relation with the scapula in foetal and post-natal periods of human life; I have investigated the age changes of the human scapula from birth to maturity and from maturity to old age; I have investigated the racial distribution of scapular types in ancient and modern man and have studied individuals of families and groups; I have investigated as possible causative or modifying factors of scapular types the possible influence of Age, Sex, Race, Stock, Environment, Occupation, Social level, Health, Disease (Rickets, Endocrinopathies, Paralyses, etc., etc.), Type and Build; and I have noted some of the morphological and functional variations coexistent with scapular types. Some of these investigations have been briefly

summarized in this address; some are still unpublished and none is complete, but in whatever direction my investigations have led me, not a bit of evidence has been found in support of the explanation, that the scaphoid in the course of years changes into the convex type. All the evidence thus far secured supports the idea of the *primal* origin of scapular types and consequently their hereditary nature, their transmission from parent to child through successive generations, not only in man but in other mammals. The finding of convex, straight and concave scapular types in ancient and modern man, their racial distribution and their hereditary nature clearly show that there can be no valid reason for supposing that the human scapula is changed in type after its earlier formation at any time during subsequent development and life. Even at 10 weeks in development the human scapula has attained that form or type which it apparently ever-afterward retains. It becomes completely ossified (a mature bone) between the 22nd and 25th year of life. Change of the *scaphoid* into the *convex* implies not merely an *alteration* in the vertebral-border contour, but a *reconstitution* and *remodeling* of the entire bone, which is an event wholly without precedent in the skeleton. The analogies of skull forms and the form or character of other discernible morphologic features, which are inherited, show that such features remain more or less fixed throughout the subsequent life of the individual from early life to maturity and onward. It seems, therefore, wholly improbable that the human scapula could be the only discernible morphologic feature whose types become completely changed, both during and after the developmental periods of life. The figures show that the decrease in percentages of the scaphoid and the increase in percentages of the convex takes place at even a more rapid rate after maturity than before maturity of the bone. Obviously the figures themselves both in reference to the change in successive age periods, from early life to old age, and the rate of change in these periods show the improbability of the scaphoid ever changing into the convex in consequence of any process now known.

Notwithstanding the trend of all evidence accumulated in the course of years leading to the conclusion, that the scaphoid does not change into the convex either before or after birth, the seeming importance of this assumption caused me in 1907 to begin observations on a number of individuals covering age periods from birth to maturity and onward. Some of these were then new-born, some in the age period between 5 and 10 and so on through successive age periods. Altogether I have had approximately 200 individuals under observation for the past 16 years. The results of these observations are that the vertebral borders of the scapula, under repeated observation, have shown no change in type either during or after growth periods. Those scapular types which were classified in 1907 as straight or concave (scaphoid) and those which were classified as convex are today in the same classification.

There are still a number of observations bearing upon the unchangeableness of scapular types in any age period, and however superfluous they may seem, some of them are here recalled: (1) One may find twins of the same sex, one of whom has convex and the other concave (Draeseke) (18). (2) Occasionally one finds an individual with convex on one side and scaphoid (straight or concave) on the other. (3) A rather frequent finding is straight on one side and a moderately or markedly concave on the other. All such scapular-type asymmetries are independent of right- and left-handedness. But all these observations only serve to emphasize the hereditary nature of scapular types and their primal or germplasm origin, and this fact, aside from all other considerations, seems to preclude any other causation in the race or in the individual. Considering the scope and results of my investigations it appears, that under no natural processes or circumstances, as yet known, does the scaphoid *change* into the convex type. It follows, therefore, that the only tenable explanation of the age incidence of scapular types, we can now offer, is: *That the scaphoid is more often found than the convex in the inherently weakened, the unduly disease susceptible, the shorter-lived individuals of the race.*

It is upon the foregoing explanation of the age incidence of scapular types that its *possible* relation to longevity is grounded. That relation is no longer a possible one, but in the light of our investigations and of the figures, it is now a very definite one. The figures seem to show a selective mortality, but they are still too meager and the span of years too great even for conjecture as to the amount of the death rate. The figures, however, do bring additional, definite evidence in support of a *relation* of heredity to longevity—a relation universally recognized by physicians, biologists, actuaries and statisticians. The investigations of Karl Pearson, Beeton and Pearson, Alexander Graham Bell, your own Edgar Holden and many others have established that relation beyond all question. A recent mathematical discussion by Raymond Pearl "indicates that from one-half to three-fourths of the death rate is selective in character, because that proportion is determined by hereditary factors. Just in proportion as heredity determines the death rate, so is the mortality selective." (The Biology of Death, Page 177). I here, merely suggest that scapular types may serve us well as useful aids in the recognition of those hereditary factors upon which a *portion* of the selective death rate depends.

Both the age incidence of scapular types and comparative studies of individuals seem to justify the inference of inherent weakness and increased morbidity in many of those possessing the scaphoid: conversely, the inference of inherent strength and lessened morbidity in many of those possessing the convex. Do these inferences ring true? Only future investigations can answer this question. But we have long known, that all humans are susceptible to disease; some more; some less. The questions are, therefore, pertinent—Who among us are, in the broadest sense, the most susceptible? And who are the most immune? We do not yet study the apparently healthy as intensively as we study the definitely sick. While we study disease intensively, we seldom so study the *soil*—the *individual*. We do not yet investigate all the possible inborn biologic factors underlying either health or disease. Just so long as we fail to search for the inborn biologic differences in individual A

and individual B, just so long shall we fail to appreciate the *soil factor* underlying either health or disease—fail to find the innate factors of disease in the making—and fall short of the possibilities in disease recognition, prevention and cure. The investigations of Kollert (14, 15), Reye (12), Nonne (31, 32), Thielka (24), Draeseke (18), Chotzan (33), Kellner (16), Clemens (19), Ball and Thomas (30), Mackey (*) and Hoesteing (26), as well as my own, have shown that the *scaphoid type of scapula* is more frequently coexistent, than is the convex, with a *basic pathology*—with an inborn, unduly-disease-susceptible soil—upon which is often engrafted various disease processes.

Summarizing the results of my investigations, thus far, as bases for further research, we may say:

(1) That observations on the R1 family in 1906 led to the classification of human scapulae into convex, straight and concave types and to the combining of straight and concave into the scaphoid type;

(2) That subsequent investigations revealed the hereditary nature—primal origin—of each scapular type;

(3) That each scapular type discloses an age incidence;

(4) That the scaphoid (concave or straight) does not change into the convex in any age period, either before or after birth; and

(5) That the age incidence of each scapular type discloses a definite relation to longevity; hence to health, to disease and to human adaptability in general.*

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*In the observations leading to the findings that each scapular type discloses an age incidence in relation to longevity, we seem to have found a principle or method of investigation of general application. The inference is reasonable, that through studies of individuals in comparable groups in successive age periods from relatively early life to old age other structural, and possibly functional, features will be found disclosing age incidences in relation to longevity.

Therefore, continued research in reference to scapular types and coexistent variations by many workers gives promise of rich rewards in the following directions:

(A) The use of ascendants and collaterals as biologic standards in comparative anthropometric and clinical studies of families, through as many generations as possible, in reference to the transmission of scapular types and other inherited variations, whether of structure or of function;

(B) The accumulation of a great many more observations in reference to the age incidence of scapular types in groups of so-called "normal" and of so-called "abnormal" individuals, representing each year of life; and

(C) The investigation of the relation of scapular types and co-existent variations to morbidity in general in individuals representing each year of life by the Clinician, the Pathologist, the Anatomist, the Anthropologist, the Eugenist, the Actuary and the Statistician.

From specific and general research in these directions may we not come to know more about the *constitution* of man? Through continued investigations may we not anticipate more general appreciation of that basic *pathology,* which is inherent in every human being to a greater or lesser degree? Just as we are now able to prevent or control epidemics of many communicable diseases by accurate knowledge of conditions underlying them, may we not reasonably expect that with better knowledge of individuals we may often prevent disease in them? Fully appreciating the nature of the soil, particularly in the young, may we not the better strengthen the weak—through well-directed effort render the *inherited soil more resistant*—and thus advance a bit nearer the *highest ideal* of the medical profession —disease prevention?

The relation of the age incidence of scapular types to longevity justifies the inference; that general recognition of scapular types and coexistent variations will finally lead to better appreciation of those inborn factors underlying health and disease—racial betterment and racial deterioration.

Literature on Scapular Types in Relation to Anatomy, Anthropology, Heredity, Morbidity, Longevity and Adaptability in General

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DISCUSSION

Dr. Grosvenor—Dr. Louis I. Dublin and Dr. Frederick L. Hoffman are somewhat familiar with Dr. Graves' work from a statistical standpoint and I shall ask them to open the discussion of this paper. May we hear from you, Dr. Dublin?

Dr. Dublin—It is now a good many years since Dr. Graves first called my attention to the work he was doing on scapular types. From the very first, I was intensely interested; for, in effect, what Dr. Graves was telling us was that he had discovered a characteristic which somehow would help us to distinguish the fit from the unfit, the long-lived from the short-lived. That is essentially Dr. Graves' thesis. Dr. Graves will remember our many meetings and my continued cooperation, although he knew very well that I was both critical and skeptical of his principal conclusion. I have remained interested throughout and have read nearly everything that Dr. Graves has since prepared. I have especially studied with the greatest

care the paper he has just read. But, I confess I am still as unconvinced as ever.

Dr. Graves' thesis is one of tremendous importance, if true. It touches the very essence of the research that you and I are constantly engaged in. But, unfortunately, there is not half enough evidence, I believe, to justify his conclusions. From the beginning to the end of the argument, there is altogether too much assumption with too few facts to carry conviction. Let us see what are the facts and what are the assumptions. And, if I go into this discussion at some length, it is not only because we are concerned with Dr. Graves' paper, but rather with the much more important question, namely, the method and spirit of scientific research. A Society like this must insist, after all, on certain standards of scientific work.

The first basic fact in Dr. Graves' paper is one of observation. He points out three types of scapulae, the convex, straight, and the concave type. His pictures show us very definitely that such types exist. On the other hand, when he tells us that these types are found in a very definite proportion at various age groups, I am afraid we are not concerned with facts. In his table you will find the widest variations among the several observers. Dr. Weiss of St. Louis, for example, reports that 52 per cent. of young children show the concave type. Dr. Graves shows about the same figure (54 per cent.). On the other hand, other observers show that such young people have not more than 25 per cent. of the cases with concave types. A glance at his table will convince any one that there is altogether too much variation in the figures for the same age periods, as reported by different authors, to justify acceptance of the figures as facts. The difficulty, I believe, is that it is fundamentally impossible to differentiate between the three types with anything like mathematical accuracy. These three types of scapulae are not mutually exclusive, but blend into one another. There are shadow zones between each of them, and it is entirely possible that a large number of scapulae, taken at random, would be differently classified by different observers. If you had 1,000 people and arranged them from

the most convex to the most concave type of scapulae, you would have no difficulty, I believe, in distinguishing those that had the most concave; those who had virtually straight, and those who had the most convex scapulae. On the other hand, there would be a great many whose type of scapulae it would be difficult to identify as either of one or another type. We are dealing with a characteristic in which the personal equation of the observer makes a lot of difference. It is for this reason, I believe, that Dr. Graves' table shows such striking differences in the incidence of the various types at the several age periods.

Dr. Graves further assumes that these particular types of scapulae are inherited. Unfortunately, he has made no attempt, so far as I can see, to study this question and determine upon the basis of fact whether there is such inheritance and the manner of such inheritance, whether it be Mendelian or blended, etc. The inheritance of this character is, in fact, the crux of the whole matter. If it actually occurs, then we are concerned with a unit character and Dr. Graves would have a very serious difficulty to overcome. As he tells us, at the beginning of life, from 75 to 80 per cent. of the population show the scaphoid type of scapula. Yet, the adult population from which the new generation springs, shows a very much lower proportion of persons with this type of scapula. Dr. Graves should have had at this stage of his study some light on this vital question, and we should no longer be left in the dark with an assumption of inheritance.

Finally, Dr. Graves assumes that the scaphoid type of scapula is associated very largely with structural deficiency and that it is a characteristic of the poor longevity types. It is difficult to correlate this assumption with his other statement that, at the earliest ages, from 75 to 80 per cent. of the population show this characteristic. It is difficult to believe that anything so common as that could possibly be a stigma of degeneracy. Here again, it would have been very desirable for Dr. Graves to have shown by direct observation that different groups of the population with reference to physical vigor show this char-

acteristic to different degrees having due regard to their age classification.

I am entirely agreed with Dr. Graves that there is no evidence for the possible changing of the bony structure during the life of the individual. I am even willing to agree with him that the conversion of any particular characteristic from an 80 per cent. incidence in infancy into a 20 per cent. incidence in advanced age is indicative of a selective process in which those who have the structure are screened out. The logic of that position is inevitable. The trouble with this argument is, however, that it leads to an absurdity, especially when we match up the results of this selective process with the actual facts of mortality; concerning which, there is no assumption whatever. For example, Dr. Graves tells us that at the very beginning of life the convex type of scapula is found in about 25 per cent. of the cases, the straight in about 50 per cent., and the concave in about 25 per cent. These are rough figures. At age 55, the proportions are changed; the convex is then 60 per cent.; the straight is 25 per cent., and the concave only 15 per cent. There has thus been a drop from 25 per cent. to 15 per cent. in the concave; a drop from 50 per cent. to 25 per cent. in the straight, and an increase from 25 per cent. to 60 per cent. in the convex. Let us apply these figures to a group of 1,000 people beginning life. Of these 1,000 people, 250 would show the convex type; 500 the straight, and 250 the concave type. At age 55, according to our Life Tables, about half of them will have passed away; the other 500 will be divided in accordance with Dr. Graves' proportions to which I have just referred. That means, of the 500, there would be 60 per cent., or 300, with convex scapulae; 25 per cent. or 125 with straight scapulae and 75 with concave scapulae. In other words, at age 55, there would be 300 persons with convex scapulae, although there were only 250 to begin with when they were all born. The assumptions of Dr. Graves do not match with the well-established facts of mortality. If, moreover, you examine his basic tables showing the incidence of the various types of scapulae at the several age periods, you will see that there is

no gradual change in their relative proportions with increasing age and that the changes have no relation whatever to the death rate at the several ages. There are too many jumps in the figures to indicate any relationship to the normal death rate. And, yet, it is through the normal course of mortality that we are asked to believe that a selective process in the scapula types occurs.

I am, therefore, compelled to come to the conclusion that the change in the scapula types with age does not occur through the screening process of death. If, at the same time, we hold to the view that the bones do not change their form during the life of the individual, we are logically compelled to the conclusion that the very phenomenon itself does not exist. That is exactly my view. I am convinced that there is no age incidence of scapula types in anything like the sense that Dr. Graves believes. We are concerned with an artifact rather than with a measurable demonstrable phenomenon. As I said at the beginning, the age incidence of scapula types depends largely on those who make the observations. There is too much room for uncertainty in the classification of the several types. They blend into one another and it is, therefore, entirely a matter of the personal equation of the examiner as to what the proportions of the scapula types found in any age period will be.

Dr. Frederick L. Hoffman—Mr. Chairman and Gentlemen: It was my privilege to discuss the theory of Dr. Graves with the late Sir William Osler, a few weeks before his death, at his home in Oxford. Dr. Graves had contributed a paper on the age incidence of the scaphoid type of scapula, to the Osler Memorial Volume, and I was glad to be able to say to Sir William that I, myself, had been familiar with the work of Dr. Graves since he first contributed the results of his research to the Medical Record, as far back as 1910. Sir William was emphatic in his views, that the work of Dr. Graves would, in course of time, prove epoch making, and he strongly suggested that I, myself, should give such attention as I might be able to do to the furtherance of his plans.

Unfortunately the subject is one of unusual complexity, to

one not trained in the technique of anatomy, nor in a position to make the many personal examinations, required to place the theory of Dr. Graves upon a sound statistical basis. But what we are first concerned with is the promise that the theory holds out, as an aid in Life Insurance examinations to prognosticate the probable longevity of the applicant. I am absolutely convinced that Dr. Graves has offered a method, which should be extremely useful in many otherwise doubtful cases. His own collection of data seems to offer an unanswerable argument to the effect that the scaphoid scapula is seldom met with, in persons who attain old age. If that theory is sound, we have a new and invaluable aid in forecasting the probable future life time of the applicant. The difficulty, as I conceive it, and I trust that I am wrong, is that the diagnosis of the scaphoid type of scapula is not quite as easy, as it seems to be to Dr. Graves, who has unusual powers of observations and a talent for fine discrimination, not often met with. For, unfortunately, the average physician today is not trained as well in his powers of observation, especially as regards minute anatomical details, as was the physician of a generation or two ago. But an even more serious disadvantage, from a practical point of view, is that few physicians have been trained to observe the scapula and its departure from the normal, as a matter of routine in physical examinations. It would be interesting to have pointed out by Dr. Graves the liability of serious error in diagnosing the scaphoid type, as a condition precedent to its adoption for Life Insurance purposes.

The contributions on the scaphoid scapula by Dr. Graves, place him in the front rank of original investigators in medicine. I am familiar with the immense amount of labor that he has expended upon his investigations, and the heavy financial sacrifices which he has incurred to carry his research to the point of practical conclusiveness. The literature on the subject is practically all his own. There have been few other contributors, who have shared his labors and given encouragement to his aims. Should the theories be proven correct, no interest would benefit more than Life Insurance Companies, who by

this means, would be placed in a position to exclude undesirable applicants, who, though otherwise acceptable would still bear the unmistakable stigmata of premature death. Dr. Graves may be encouraged by Life Insurance Companies, earnestly interested in medical research for Life Insurance purposes and his investigations should be placed upon a more substantially numerical basis, so that the conclusions may bear the obvious stamp of finality.

I cannot, within the required brevity of my remarks, refer to the various papers on the subject, which Dr. Graves has contributed during the last fifteen years, but I may refer to his observations on the possible connection of syphilis and the scaphoid scapula, as to which I am very much in doubt. What he has to say on this subject, however, is extremely suggestive and I quote from his address, originally contributed to The Journal of Cutaneous Diseases for April, 1913, as follows:

> "With the use of modern refinements in clinical investigation, with the use of laboratory methods to confirm and control clinical deductions, with patient study of individuals and of individuals of families, rather than the histories of individuals of families, the clinical significance of the scaphoid scapula and its syndrome may be readily determined. Clinical consideration of the scaphoid scapula and its syndrome by many workers will, undoubtedly, broaden our conceptions concerning the pernicious effects of syphilis in individuals who have acquired it, in their children and in their children's children."

To the foregoing I add a summary of conclusions on the scaphoid scapula, by Dr. Victor Kollert of Vienna, translated from the German for the Interstate Medical Journal of 1914:

> "1. The scaphoid form of scapula—characterized by a concave medial border and an angulus inferior lying in the perpendicular below the most medial point of the spina—is an abnormality originating in intra-uterine life. Its proximate conditions of development are still obscure. The form of the bone at birth remains in general unchanged during extra-uterine life.

2. The scaphoid scapula is the sign of a congenital constitutional inferiority of the individual. Its bearers die in early years mostly; hence the abnormality occurs very seldom in old age.
3. The morbidity from tuberculosis is great in persons with scaphoid scapula; the acute forms of the disease seem to predominate.
4. Between the normal type with convex medial border and the abnormal form there are transitions which may be the cause of errors in classifying a given case. Both typical fundamental forms probably never occur in one individual during extra-uterine life."

In conclusion I wish to once more express my profound admiration for the extraordinary ability and courage with which Dr. Graves has carried forward his investigation, while giving expression to the hope that he may have in the future the wholehearted cooperation of the Associated Life Insurance Companies, to bring his promising researches to a final conclusion, applicable to the needs of Life Insurance and medicine.

Dr. J. Allen Patton—The suggestion of our President that I discuss the paper of Dr. W. W. Graves on Scapular Types led me to look into a phase of physical makeup that hitherto had attracted very little of my direct attention.

I have recognized for many years that all differences from the normal structural character of the human body would mean something of value to the medical director, provided these differences could be observed and recorded accurately and uniformly and in sufficient numbers for a sufficient length of time to permit of a Medico-Actuarial statistical study. Dr. Graves for the past 17 or more years has given close attention to the abnormalities of the human shoulder blade and his conclusions, even should they prove purely clinical, should be valuable in insurance medicine.

We will all readily agree that no two applicants are exactly alike. Many instances arise in our work to cause us to refer to heredity, family and racial characteristics, occupation, weight, etc.

The structural makeup of the individual in bone and flesh, the

size and shape of the head, chest, abdomen, extremities, etc., are also factors requiring study and consideration. Therefore the varieties of the scapulae may well repay us for a statistical study. The classification of the scapulae into the normal or convex vertebral border and the abnormal (scaphoid) or straight or concave vertebral border might be made if all insurance cases were to be examined carefully with this in mind. The examiner must then note and record the applicant's attitude or posture; whether the shoulder of the affected side is dropped; whether the vertebral border is convex, straight or concave; whether the length below the spinous process is proportionally longer than the breadth or the scapular index is abnormal. Other possible skeletal or muscular abnormalities must also be recorded as they might affect the conclusions to be reached in the case.

Is it advisable to place this additional requirement in the physical examination of insurance applicants? Would the results prove adequate if such examinations and records were to be made only upon those cases whose general appearance and contour indicated such possible abnormality or should we have the record in all cases to make the insurance study of value?

Though the convex usually predominates, yet all three types have been found in all his groups studied, and he believes the scaphoid type is not of modern development or due to the modes of life and work of the past few generations. Based upon his studies heredity is markedly shown in the transmission of the scaphoid scapula. Parents with similar scapulae usually beget similars, while those with diverse scapulae usually beget the scaphoid types. The child is frequently a victim of adenoids, nocturnal incontinence, and subject to vascular sclerotic changes. The scaphoid type is not necessarily an indication of syphilitic parentage but frequently such is found to be the case. The scaphoid scapula indicates lessened resistance or lowered vitality, hence is more frequently found in the deviate or abnormal and is a sign of congenital constitutional infirmity, being never acquired, but is foetal or primal and hereditary.

Judging from our own experience the doctor wisely states

the average man is the standard (and not the physically perfect) for us to use and that the lack of resistance is shown by the asymmetrical or abnormal physique. A greater proportion of scaphoid scapulae is found in this latter class and stress is placed upon the degree of scapular change as of importance in determining the effect of the abnormality.

Concerning the importance of the age incidence the scaphoid type was found to occur with great frequency among the young, but relatively infrequently among the old. The normal convex type of proportionally increased in each age group or decade when relatively large groups were examined as 80% scaphoid in age group up to 10 years changed to only 20% in age group from 70 to 80 years.

We must, I think, agree that the scaphoid type does not and can not change to the normal convex as the individual grows older and especially must this be considered unlikely or impossible after full adult development at age 25. The author's personal observation for 16 years of about 200 persons bears out this belief and also adds force to the hereditary theory. The conclusion seems justified that the inherently weak have more scaphoid scapulae proportionately for both decrease in advancing age groups. Surely there is force in the argument that here we have a physical sign of inherited weakness, of a constitution unable to withstand the attacks of disease or the stresses of modern life, as well as the average normal man, and we use this latter individual as our standard or normal.

Admitting, as I think we must, the value to the clinician of Dr. Graves' observations and studies, how can we best utilize his results in our work as medical directors? I foresee many difficulties in attempting to apply this additional examination feature, complaints from examiners, agents, applicants and from executives because it will not be generally used. I do see some value to preventive medicine, therefore in our longevity work and in health examinations. Perhaps we can start its use in insurance cases where the examiners report general appearance of the applicant impresses unfavorably, but no definite organic defect is noted.

We owe Dr. Graves a vote of thanks for the presentation he has given us of this interesting subject.

Dr. Rogers—Mr. President: I do not feel that my views of this subject are of sufficient value to justify much of your time. I started by approaching this subject from the point of view so well expressed by my friend, Dr. Dublin, and I met with the same difficulty that he so well describes, namely, I was unable to account for the large proportion of the convex type still existing at the late ages of life. I finished reading this paper of Dr. Graves', however, with the feeling that we seldom have an opportunity to see a subject so steadily and persistently followed as Dr. Graves has done. I feel very grateful to him for giving us an example of steady and persistent study. Any man who does such work is bound to dig up something in the long run. I found myself satisfied, too, that there must be some relation between the character of the vertebral margin of the scapula and longevity. The figures themselves, while I cannot reconcile them, trend in a way to leave an impression in my mind that the extreme concave scapula represents a feeble type and that the extreme convex scapula represents a resistant type. The picture I get is that the best types of human scapulae are convex, that the poorer types are concave and that the straight scapulae somewhere intermediate between the convex and the concave, and the average scapula probably has a margin distinctly convex.

Now, granting that this is true, what are we going to do about it in life insurance? It may be that if each of ten of us were to study 2,000 scapulae just as we find them, and after ten years make an actuarial study of them, I am certain that, at the end of that time, this society would be able to answer Dr. Graves' question and meet the issue with absolute certainty. I doubt that "the game is worth the candle."

Dr. Graves (closing)—I hardly feel, Mr. President, that I should take up more time of this Association, and yet I must beg your indulgence for just a few words. First, let me express gratitude to those who have so liberally discussed my address, which represented only a brief summary of the results of ob-

servations and investigations of more than 17 years duration.

Some philosopher said: "Figures can't lie, but liars can figure." Now, I am not throwing bricks at any one, nor dodging any thrown at myself. The figures in the mimeographed table before you represent approximately 20,000 human lives from the tenth week in foetal existence to 90-plus years. The figures merely illustrate the fact of the age incidence of each scapular type, but they do not explain that fact. The tabulation represents the findings of many workers, some of which are fairly accurate; others more or less so. Neither Kollert, whose remarkable study is based on 1,000 autopsies, nor Warburg, whose study is based on 1,000 public-school children, fully appreciated the classification. Cunningham in her study on university students, although appreciating the classification, nevertheless, attempted to measure it on the living in millimeters, and in that study the numbers of straight compared with the number of concave is at variance with every other tabulation of the same age period represented in the table. Weiss examined school children without removing the clothing —unavoidable technique. Such discrepancies or variations in the figures of Cunningham and Weiss are not serious faults, because straight and concave for fundamental, anatomical and architectural reasons are justly combined into the scaphoid type. The figures represent decenniums and not each year of life, and the decenniums are obviously not uniformly represented as to numbers in the table, and especially is this true beyond the 50th year of life. With but few exceptions, the source of the tabulated material was not similar. Surely there is no similarity in the nature of the material represented by prostitutes, feeble-minded and prison groups on the one hand and school children, university students and selected men of the Army and Navy on the other; therefore the dissimilar nature of the material, the discrepancies in numbers represented in the successive decenniums, the lack of appreciation of the classification or faulty technique by some investigators and the meager number of only 20,000 human lives represented in the table compared with many times that number in life

tables render the figures unsuited for comparison with a life or mortality table. The personal equation in any investigation, in any direction, on the living must always be reckoned with, and I have called attention to this fact in presenting the table. Nevertheless, when we compare the similar material represented in my table in similar age periods there is striking similarity in the figures illustrating the age incidence of each scapular type. I have long known that the figures in my table are not comparable to those of a life or mortality table. There is and can be no parallelism, and primarily so because my table and a life or mortality table represent entirely different data. Dr. Dublin makes the astounding assertion that "there are no assumptions whatever concerning the actual facts of mortality". Now some of the facts of mortality are represented in life and mortality tables. Let us see a bit of the foundation of the "actual facts". A life or mortality table is based primarily upon registered births and deaths or observations on insured lives. In the course of its construction various assumptions are made, averages are arrived at and smoothening processes with heavy mathematical formulae are utilized. A life or mortality table is certainly not a perfect standard. It is subject from time to time to modification and revision but it serves well the purpose for which it is constructed, although it is not, nor is my table constructed to explain the age incidence of scapular types. My table is not smoothed out by mathematical formulae; has nothing whatever to do with the more or less inaccurate registration of births and deaths; nothing to do with averages, but it merely illustrates a fact as yet unparalleled in human morphology—the fact of the age incidence of each scapular type. Neither can my table nor any life or mortality table alter the constitution of man, nor any feature in man's makeup; neither can the one nor the other aid us in any way in answering the important and practical question: Does one type of scapula change into another at any time during pre- and post-natal existence? Neither can any mathematical formula nor any life or mortality table thus far devised answer this question, because, if one type changes into another, it

must be due to some natural process, and such a process will remain forever unaltered by the figures in any life or mortality table. Figures cannot alter facts, but facts do alter figures.

Freed from all verbiage and innuendo many of Dr. Dublin's assertions mean just this: That my table does not stand comparison with a life or mortality table. And in this fact we are agreed, unanimously agreed. Did I not point out this fact in my address when I said that the amount of the death rate could not even be conjectured from the figures in my table? But Dr. Dublin is not content with that bare fact. He goes further. He enters upon the discussion with a great deal of feeling. He almost tells you that the figures in my table, based upon the patient work of many, are wholly untrustworthy; he does say my work "is unscientific"; that "if bones (scapulae) do not change during the life of the individual, we are logically compelled to the conclusion" that "the very phenomenon itself does not exist"; that "we are concerned with an artifact rather than with a demonstrable phenomenon"; that "the age incidence of scapular types depends largely upon those who make the observations" and that the only tenable explanation of the age incidence "leads to an absurdity when we match up the results of the supposed selective process with the actual facts of mortality". Even making a liberal allowance for the personal equation and admitting the imperfections of my table, the figures, nevertheless, clearly illustrate the age incidence of each scapular type. As a matter of fact the tabulation of a single worker represented in the table, practically in any two successive decenniums, illustrates the age incidence of scapular types. This fact must be admitted even by Dr. Dublin; hence to remain logical he must then say that the explanation of the age incidence of scapular types can only be, must be; that one type of scapula does change into another. Moreover, to remain logical Dr. Dublin must say that the figures in life or mortality tables prove that scapular types change. But all genetic, morphologic and environmental evidence thus far secured say they do not change. Figures say they do; Nature and Nurture say they do not. In such a dilemma which shall we believe?

Dr. Dublin flatters me when he states that my "thesis is one of tremendous importance, if true" and that "it touches the very essence of research in which we are all engaged". But in the next breath he asserts that "there is not half enough evidence to justify conclusions", and "there is altogether too much assumption with too few facts to carry conviction." He then proceeds to emphasize the discrepancies and variances in the percentages in our table which are obvious. Dr. Dublin would have you believe just what he apparently sees: that the material in the table is similar; whereas, in many respects it is dissimilar, as one seeing life, as well as figures, may see for himself. Dr. Dublin even discredits the classification of scapular types and baldly asserts and emphasizes the difficulties in classifying human beings, living and dead, in reference to scapular types. The table shows that the percentages of scapular types found by different investigators in similar material for a given age period are strikingly similar. The similarity in the figures in similar mateal secured by different investigators on living and dead material answers every possible objection to the difficulties of classification, baldly asserted and emphasized by Dr. Dublin. There are, of course, precautions to be taken to avoid pitfalls of error in every part of a physical examination, and with these in mind any two qualified examiners will secure similar results with scapular classification in the living and dead. The mere figures in the table establish the fact of classification and of the relative ease and accuracy with which it may be made on the living. Therefore, the bald assertions of Dr. Dublin cannot alter these facts. Had he read my address, or had he listened to it with open mind, or had he even superficially considered the similar and dissimilar material shown in my table, he could never have given utterance to his assertions in reference to classification nor to the difficulties in making it.

Dr. Dublin next tells us that the inheritance of scapular types is "an assumption" and that "inheritance is the crux of the whole matter". He tells us that "if scapular types are inherited, we should have some light on this vital question"; "we should no longer be left in the dark with an assumption", and that I

"have made no attempt to study the question": "whether there is inheritance?" Now, that is just exactly what I have been doing from the date of my first observations on the members of the RI family. I have studied, and so stated in a footnote, which evidently he has not read, fragments of approximately 1,000 families; in some 5; in some 4; in many 3 and in many more 2 generations. From these studies, I have briefly summarized the findings illustrating what seem to be laws of transmission of scapular types from generation to generation. The inheritance of scapular types is obvious, or may easily be made so to any one who will study the members even of his own family. When one finds such relatively large percentages both in pre- and post-natal periods of life, can one conceive of any definite causation of scapular types other than heredity? Though I have not presented statistical data on family studies, I have presented much data in evidence of the primal origin of each scapular type in a chart showing the percentages of convex, straight and concave types in mature, mixed-stock, dissecting-room material, in dynastic Egyptians and in Pueblo and Peruvian Indians. Both the presence and the relatively large percentages of the 3 types found in all ancient races and stocks thus far investigated justify the indubitable inference of the primal or germ-plasm origin of each scapular type and the finding of each scapular type in some mammals below man further justifies this inference. If they are inherited from generation to generation, we should expect to find the same types in pre-natal life in man and in other mammals, and this is just what we do find in man and in other mammals. In the lantern demonstration I showed human embryos as early as the 10th week in development with typically convex, straight and concave types. I showed the same types at full term and the same types practically in every other period of life after birth, and yet we are told by Dr. Dublin that I have "assumed the inheritance" of scapular types instead of "presenting evidence of that fact". Not only have I demonstrated with the lantern each scapular type in pre- and post-natal life, but I have shown them in members of the RI family and in 3 gen-

erations of another family. Had time permitted I might have shown photographic evidence of the inheritance of scapular types in approximately 200 families. Dr. Dublin is right: "the inheritance of scapular types is the crux of the whole matter". I have assumed nothing from the date of my first observation in the RI family concerning inheritance nor concerning any part of the problem. I have presented in my address, so far as it is humanly possible to do so in the limited time, indubitable evidence of the primal or germ-plasm origin, and therefore the inherited nature of each scapular type. Why is the inheritance of scapular types "the crux of the whole matter?" I answer, because Dr. Dublin knows, and we all know, that inherited features are a part of the *Anlage* of man, other mammals and other living things, and that in no instance have such features been completely changed in their form or type by any natural process after attaining their type-formation nor during subsequent development and life.

It is not true that I have had many meetings with Dr. Dublin. I have had just four brief conversations with him, and I prize most highly several encouraging letters over his signature, but it is not true that at any time prior to this meeting he was either "critical" or "skeptical" about my principal conclusion, namely, the fact of the age incidence of scapular types. Concerning my explanation of the age incidence, however, he was always very properly "critical" and "skeptical". He always appeared to be greatly "interested", and it is apparent to all of us that he is still greatly "interested". His only valid criticism has always been just the same, and it is today, as a matter of fact, despite his many assertions to the contrary, just the same that any one could properly make, and it has always been just this: may not one scapular type change into the other, i. e., scaphoid become convex? But today, strange as it seems to me, and must so seem to anyone who has heard my address, and especially must it seem strange to Drs. Hoffmann, Rogers and Patton who have read and heard it, to listen to Dr. Dublin's declaration that my work is "unscientific"; "clothed with too much assumption" and "with too few facts to carry conviction". Both the scope of

my investigations, including observations on relatively large numbers of the living over a number of years, covering all periods of life, and the result of all my investigations thus far show that there does not exist a scintilla of genetic, morphologic nor environmental evidence neither direct, by analogy nor by inference, that would lead one to suppose that the scaphoid type by any natural process now known does in the course of years change into the convex. A number of individuals under observation were subjected to photographic records 10 years ago, and I have shown with the lantern in representatives of 3 families that the types of shoulder blades possessed by them then are possessed by them now. Investigations in this direction will be continued not only by myself, but I sincerely trust by every member of this Association on members of his own family and on other individuals.

In no particular are my investigations complete, but no bald assertions of Dr. Dublin, no reference to the "methods and spirit" of my work, no sophistries, no application of the figures in any life or mortality table can alter the evidence thus far secured in the following directions: (1) That human scapulae may be classified with but few exceptions into 3 types (convex, straight and concave) readily recognizable in living, skeletal and foetal material; (2) That they have occurred in varying degrees and percentages in all races of man as far as we have been able to trace them backward in their skeletal remains; (3) That similar scapular types occur in some mammals and particularly so in those believed to be nearest to man, namely in the gorilla, orang and chimpanzee; (4) That they are distinctly inherited in man and other mammals through successive generations: (5) That each scapular type in man discloses an age incidence; (6) That there is not a scintilla of genetic, morphologic or environmental evidence even tending to show that one type does or can change into another by any natural process now known; and (7) That the work of myself and many others show that scaphoid types are more often correlated with inherent weakness and increased morbidity than are the convex types. Such correlations are indicated beyond

all question or doubt in our tabulation. Compare, if you please, the percentages of scaphoids in university students with those in prostitutes, feeble-minded and prison groups; compare, if you please, the prison group and the prostitutes with the selected men in the Army and Navy in the studies of Ball, Butts, Weaver and Mackey. Furthermore, compare Weiss' public-school with my orphan group. Comparison of the cold and unfeeling figures in my table, even they, demonstrate in some degree the nature of the soil frequently found in the possessors of the scaphoid types. Notwithstanding the admitted inaccuracies, meagerness of the figures and the lack of uniformity in the nature of the material, the figures, nevertheless show a relation, the degree of which we do not yet know, of scapular types to morbidity and human adaptability in general, yes, even more to longevity. There can be but one objection to the recognition of that relation, and that is: the figures in my table do not stand comparison with those of a life or mortality table. Although I am unskilled in figures, and although I have strenuously avoided trying to fool myself with figures, I do know this as a clinician, that the figures represented in a life or mortality table when used as standards, do not and cannot alter life as manifested in the individual, his fraternity, ascendants and collaterals. Life and mortality tables say they do: Nature and Nurture say they do not. Again I say, which shall we believe?

Dr. Rogers is nearly right when he says that a large percentage of the convex must represent the best human types; the straight the next and the concave the next best. In a larger sense, this is undoubtedly true, but there are many excellent human types with straight and concave shoulder blades, and there are many poor types with convex shoulder blades. How many in each direction is one of the problems of the future? I have emphasized today, and will again and again emphasize with all my being, the fact: that scapular types are not "yard sticks" with which we may measure man, any of his structures, any of his functions. They only represent one very accessible part of the individual's makeup. They represent only one of

man's inherited variations, and they can only be properly interpreted by considering coexistent variations, both in number and degree, as may be found in the total makeup of the individual. Let me here say that comparative studies of families, of individuals, of groups and of skeletal material disclose the fact that one seldom finds even a moderately concave shoulder blade in individuals after the 6th decennium of life.

Dr. Hoffman's reference to a visit to Sir William Osler a short time before his untimely death and to his encouraging appreciation of my problem almost seems like a voice from the dead demanding more and more investigation. When I was invited by your President to address you on the subject that has occupied so many of the best years of my life, I welcomed the invitation, because it gave me an opportunity of summarizing my work on what has always been one of the vital and enduring problems of clinical medicine, namely, the Constitution of man, or the relation of morphology to morbidity, longevity and human adaptability in general. Such a relation has long been recognized by physicians, and I merely state a fact when I say that practically the first definite proof of that relation is found in the only tenable explanation of the age incidence of scapular types. The final proof of the correctness or falsity of that explanation can come, not by the comparison of the figures presented with those of a life or mortality table, but by classifying a large number of human beings representing each year of life in reference to scapular types, by following them through life, and ultimately recording the cause of death. Drs. Hoffman, Patton and Rogers have very properly referred to the difficulties to be met with in attempting to carry out this line of investigation. Obviously, it cannot possibly be carried out by any single individual. It does seem to me, however, that fairly accurate observations on approximately 200,000 lives as selected by insurance examinations could be made and then as death matures the policies, we would gradually acquire data from which it could be definitely determined whether convex- or scaphoid-scapular-typed individuals more nearly approached the expectancy of life. From this data specific

mortality rates in reference to scapular types could also be determined. Not only do these lines of investigation seem to be feasible, but at the same time records should be kept of those individuals who fail to pass the required examination, also of those accepted as substandard risks. These are crucial tests, the best possible tests for proving the truth or falsity of the only tenable explanation of the age incidence of scapular types at this time. It seems to me that the promise of rich rewards warrants such investigations. I stand ready to aid in every way in securing as nearly as possible accurate data in such investigations. Whether you may agree with me or not concerning the feasibility of the suggested investigations, my own investigations shall not cease as long as I am permitted to work. My only regret is that I may not have a hundred years to give to the still larger problem, the problem of inherited variations in general in their relation to human morbidity, human longevity and human adaptability in general. In conclusion, gentlemen, let me say that if we cannot reasonably infer that all human beings were and are made alike, and that there never were nor are there now any differences between individual A and individual B, then inherited variations, including scapular types, represent an universal and vital problem of biology and medicine, demanding continued earnest investigation. We have found in scapular types not only conditional morphologic indices of the constitution of man but also logical basis for correlating coexistent variations. Shall we or shall we not go on? I have answered this question for myself. May the physicians of this Association and physicians generally likewise answer it!

SECOND DAY

President in chair. The meeting was called to order promptly at ten o'clock A. M.

The Secretary announced that he had cast a ballot as instructed for the officers and members of the Executive Council whose names were placed in nomi-

nation on the day preceding by the Nominating Committee. These officers and members of the Executive Council were declared elected, as follows:

PRESIDENT

WILLIAM R. WARD, M.D.

FIRST VICE-PRESIDENT

CHESTER F. S. WHITNEY, M.D.

SECOND VICE-PRESIDENT

ANGIER B. HOBBS, M.D.

SECRETARY

CHESTER T. BROWN, M.D.

TREASURER

CHARLES L. CHRISTIERNIN, M.D.

EDITOR OF THE PROCEEDINGS

EUGENE F. RUSSELL, M.D.

MEMBERS OF THE EXECUTIVE COUNCIL

GEORGE A. VAN WAGENEN, M.D.
EDWIN W. DWIGHT, M.D.
J. ALLEN PATTON, M.D.
WESLEY W. BECKETT, M.D.
JOHN B. STEELE, M.D.

Dr. Grosvenor—We are very fortunate in having with us today Dr. S. R. Benedict and Dr. O. H. Folin, who have been collaborating at the laboratories of the Metropolitan Life Insur-

ance Company. I am sure that Dr. Knight can introduce these gentlemen better to you than I can, and I am going to call upon Dr. Knight to say a few words.

Doctor Augustus S. Knight, as a preliminary to the introduction of Professors Stanley R. Benedict and Otto Folin, described briefly the unsatisfactory experiences of his Company in its Home Office Laboratory work due largely to the faulty methods of analysis and to the unavoidably varying, inaccurate interpretations by different observers. He told how those experiences had led to the selection and employment of three of the most skilled men of the country in biological chemistry, to make an exhaustive study of the Home Office Laboratory conditions and to report their findings and recommendations.

Their report showed very clearly how inaccurate and undependable are the methods used by practically all companies for testing for sugar and for albumin, and they made such recommendations of new methods which they had designed and which promised such improvements in technique and in correct quantitative results, not only for the Metropolitan but for all companies engaged in the business of life insurance, that the Metropolitan Life Insurance Company has gladly engaged the services of these two Biological Chemists as the Directors of its Home Office Chemical Laboratory for routine work and for research.

Dr. Benedict—Dr. Knight has told you how Professor Folin and myself came to be connected with the work of the Metropolitan laboratories and I might add to what he said that he asked me not to spare the Metropolitan in any way, shape or manner, in what I had to say, but to tell you frankly what we found there and not to mince words about it. I shall not go as far as that. I shall be charitable and say that we found that the laboratory conditions were very unsatisfactory.

Now the question comes up at once whether this is from an academic standpoint or from a practical insurance standpoint? Is it from a statistical standpoint? Is it from the standpoint of the practical applications you are making of the work done in insurance laboratories? We realize very clearly that we

might be open to the general criticism of taking a dogmatic, hair-splitting attitude towards insurance problems which is not warranted. For that reason I shall go very briefly into detail in regard to the more general criticisms of the laboratory work done at the Metropolitan, and I would say as a preliminary to that, that we have every reason to believe that the laboratories at the Metropolitan are at least as good as if not better than those in 99% of the other insurance laboratories in this country.

Coming into the laboratories we were impressed first by the point as to whether the insurance companies have solved their most fundamental problems. What have they done regarding such problems? Well, the first question that met us was the preservation of the urine sample. We found a large percentage of the samples coming into the laboratories wholly decomposed; a good proportion of these were reported as analyzed for sugar, albumin, casts, etc., though absolutely decomposed. Yet that record goes on the statistical cards. The sugar would have disappeared from those urines, and they would have been absolutely worthless for analysis. Boric acid was being used. When boric acid was first proposed as a urinary preservative I do not know. You will find that insurance laboratory men can give you a line of very definite advantages for boric acid as a urinary preservative. It has only one disadvantage, and that is, that it is not and never will be a urinary preservative! There's no question about that. The companies have not systematically investigated the fundamental question of a proper preservative. That is not a question that Professor Folin or I or anyone else, who is not experienced in that line of work, can answer. It is a specific insurance problem that must be worked out under insurance conditions. We preserve our urine samples as long as we want to keep them, but that the preservative we use would fit the conditions that insurance companies meet, we do not know.

Coming to the next step in the handling of urine, we found that the samples go into two different laboratories and they are analyzed or examined by certain methods. We found that from the standpoint of the final report, certainly 80% of the

finding is a personal matter. I go into one laboratory and see the test for albumin being carried out. I see a cloud of a certain depth. That is called a very slight trace of albumin. I see another cloud of the same depth called a slight trace. What do I see in the next laboratory? A cloud considerably deeper than was called a slight trace of albumin in one laboratory is recorded as no albumin.

Now this all goes on the cards. Dr. Dublin finally gets them and they go through his wonderful machine which separates them all into groups and they come out and statistics are compiled from them. But what can those statistics mean? It is obvious that you are going to get to the point that Dr. Dublin found was being reached or had been reached, that the analyses mean nothing finally; that the companies would be about as well off without them as with them on the border-line cases, the cases where there is really room for any question, because one case will be reported a slight trace of albumin from one laboratory, and from another laboratory will be reported no albumin where there is just as much albumin present.

If this condition obtains in one central company with its two laboratories, the head of one of which was trained in the other, think of what the difference must be in recording those strange signs throughout the various companies. Then statisticians attempt to get these together and draw conclusions from those data—you can't do it.

In regard to the sugar situation the matter was just as bad, or even worse. There is a separate tube for each sample, containing Fehling's Solution, this is heated and a certain amount of urine added, not a definite amount, but a small quantity is poured in. The tube then stands for two hours in one laboratory, and for twenty-four hours in another.

I am going to illustrate one of the fundamental recommendations that we made. Insurance problems should be worked out in insurance laboratories, but we were able to make a few suggestions and recommendations along lines that we believe will be helpful and I want to take up a few moments for the discussion of the sugar procedure.

Investigations within the last few years have shown very conclusively, without leaving any room for question, that all urine contains sugar. There is no question of that whatever. All urine contains sugar which will reduce Fehling's Solution. Most samples of urine contain also interfering substances which will counteract that tendency to reduction with Fehling's, so that the majority of normal urines will not give a Fehling's reduction as we ordinarily carry it out, but in a sample containing a given amount of sugar, one will give that reduction and another will not, depending upon the creatinine and other interfering substances.

If you get that clearly in your mind, that all urines contain sugar you can follow this idea. Once acknowledging that fact why not grant it frankly and attempt to get a method that instead of telling you what a urine does or does not contain, tells approximately how much, and get it on a basis where the personal equation cannot enter, where the man doesn't have to look for a particular depth of cloud against the sky-line and decide whether to call that a cloud or not, but get a basis which you can put into any laboratory in the country so that when you compile your statistics you will know they all mean the same thing, and not a personal interpretation of one individual.

The question of what sugars occur in normal urine is at the present time, with our relatively crude methods, essentially an academic question. We grant that freely, but the fact that these sugars will all of them reduce Fehling's and give a sugar reaction is conclusive evidence that they ought to be considered in the insurance question at the present time.

We were able to recommend a relatively simple procedure which will indicate within a reasonable limit of accuracy the amount of actual sugar content of every sample of urine examined. That is based on a procedure the basis of which is illustrated here.

We simply subject every urine to a reaction which will give a certain amount of color from a definite amount of sugar, and then dilute that urine so treated to a definite volume and compare it with color tubes into which we have put colored solu-

tions corresponding to known quantities of sugar. If those of you who are close will examine these tubes you will see that they graduate in depth of color from a light to a dark shade. One corresponds to a solution or a urine containing .1 of 1% of glucose; another to a urine containing .2 of 1%, and so on, which represents the ordinary range of sugar content and will cover all the range of ordinary urine samples or of those that are definitely pathological up to 0.5%.

In carrying out the method on a large scale the practical question of employment on a large scale comes up at once, and I am going to illustrate how the actual working of that method is carried out, in order to show you it is perfectly practical for insurance laboratories.

I have here two samples of urine, one of which gave a Fehling's reaction as run in the ordinary routine method in the Metropolitan laboratories and one of which did not. They contain almost exactly the same amount of sugar.

TEST—

You will notice that I do not rinse out the pipette between measuring the urines, except as it rinses itself, because I draw the urine to the top and use only the bottom portion of the urine; that rinses out the pipette of its own accord, so that we do not have a contamination from one sample to another that will interfere with anything. We measure one cc. of this urine just as it comes without filtering it or paying any further attention to it, after that add three ccs., (and that can be done from an automatic pipette, just running the tubes one after the other, or it can be done from an ordinary burette) of picric acid solution to each of these tubes (the strength of the picric acid solution is .2 of 1%), half a cc. of sodium hydroxic solution, 5%, and five drops of 50% acetone solution, which causes a disappearance of color due to creatinine in the urine which would otherwise interfere. Those tubes are numbered and set into racks which hold ten tubes and the entire rack is then immersed in a large vessel of boiling water. These tubes are supposed to remain in that boiling water for a period of

ten minutes, but we shall be able to get the reaction very nearly to completion in a very few minutes. This waiting ten minutes is not wasted because, while this is going on, the determination of the albumin is being set up and getting ready for reading, so that the two will fit into each other, and in lots of ten these can be run very readily—much more so than boiling a series of ten Fehling's tubes separately. The difference of time is scarcely against this method at all. You will see that the contents of these tubes are becoming darker in color, and that the reaction takes a little time in boiling water to reach a maximum color. The big thing has been the elimination of the reaction of interfering substances. This reaction with picric acid and alkali is given much more intensely by creatinine, a normal constituent of urine than by sugar, and it would seem at first that it was impossible to make use of that color, but we find that the acetone completely abolishes the color due to creatinine without affecting that due to sugar, so that the creatinine color fades out at once and the sugar color gradually grows stronger and reaches a final definite maximum.

In order to save time I shall take the tubes out now. You will notice that the tubes are graduated at 25 cc., and each tube is compared with this row of standards very quickly in a suitable light and you find which one it matches most closely. This comes obviously very close to the .3%—is slightly minus —and it goes down as .3% minus, or if you don't want to split hairs, call it .3%. That is a result that would be duplicated in any laboratory in the country if the method is run properly, and when it goes on to the cards it means that that is the absolute content of that urine sample. You will find a great many samples that run as low as .1% or below. We do not care to graduate below that.

Now this next tube we pick out in the same way. It comes between .2 and .3%, so that these tubes would read almost but not exactly the same amount of sugar, one reading slightly higher than the other. For clinical purposes those tubes would be absolutely identical, but one of them gives Fehling's and the other does not. They represent border-line urines that run

between .2 and .3%, and as we run large numbers of those we find that just at that border-line, Fehling's may or may not be positive, the final record of that case going down as a Fehling's reaction, and in another case having the same amount going down with exactly the opposite report. That would of course be impossible under a system of analyses such as the one here proposed.

Dr. Otto Folin—The fundamental trouble with life insurance laboratories is that their chief workers are not laboratory men. You call men whom you put in charge of those laboratories and who are expected to furnish you with laboratory results. While the men may be very capable when called they are required to work under conditions which in a few years will destroy their original capacity for high grade laboratory work and those men therefore inevitably cease to be competent. After a laboratory chief has spent a few years passing on applications for life insurance in his office, he can not but fail to remain an expert in laboratory work. The result is that the actual work is done by young assistants, technicians, who have had very little training and who try to do the work just as the director of the laboratory did it when he first began, five, ten or fifteen years earlier. Progress is impossible under such conditions. The atmosphere is wrong. The laboratory chief must remain a practical worker whose function is not only to see that the tests are well made from day to day, but who has time and facilities for making new contributions. There is no reason why the laboratory chiefs of the larger insurance companies should remain sterile, and they will not remain sterile, if an effective demand is made for progress.

In making a survey of the conditions at the Metropolitan Life Insurance Company the committee made certain recommendations concerning changes in the tests to be used. The leading thought which guided us in these studies was the conviction that it is time to replace the old qualitative chemical tests by quantitative processes. The only quantitative work heretofore done is the nearly useless determination of sugar in urines so rich in sugar that there can be no question about the

decision concerning the applicant involved. It makes very little difference whether a sugar urine contains 0.7 per cent. or 7 per cent. of sugar since either value or any value in between means refusal of the applicant. The quantitative method discussed by Dr. Benedict on the other hand takes the place of the quantitative tests and gives at once the needed information.

Dr. Benedict has told you that every urine contains sugar. I am not quite prepared to make exactly the same statement regarding albumin, but so nearly so, that I am at least willing to give such a postive statement the benefit of the doubt. Urines containing casts, cylindroids, or cells of any description, theoretically must contain albuminous materials. To be sure we have hoped that those materials remain insoluble and to that extent fail to react as albumin, but theoretically albumin is there, and practically it is nearly always found if sufficiently delicate tests are employed. In view of such a condition it is as important in the case of albumin as in the case of sugar that quantitative processes be substituted for qualitative tests.

For albumin all have depended on the nitric acid tests. This time honored test has excellent merits. As a qualitative test it is not bad, although it undoubtedly occasionally gives elusive results. But the quantitative aspects of the ring test with nitric acid are necessarily misleading and the attempts to interpret the test by such terms as very slight trace, large trace, or to actually introduce percentage figures for albumin on the basis of the test were foredoomed to failure. If one stops to think of the character of the nitric acid test it must be recognized that it is impossible to use the ring test in any quantitative sense. We have three zones in an albuminous urine to which has been added nitric acid. The clear heavy acid below, the albumin ring, and the nearly clear urine above. It is perfectly obvious that the width of albumin ring depends very largely on how the nitric acid is added, since the clear urine above the coagulated zone also contains just as much albumin as is present within the coagulated zone. Any one who will try to get variable instead of uniform albumin rings by means

of nitric acid can easily do so, and it is unreasonable to expect that the width of the ring shall vary very closely with the concentration of albumin present.

In connection with the nitric acid test one often gets considerable confusion due to nuclein material, resinous materials, uric acid, etc. There is room for much skepticism about such products in connection with the nitric acid tests unaccompanied by careful study of the urines involved. On the other hand I would call attention to another possibly more frequent source of confusion which, so far as I know, has never been described, yet must have been encountered in life insurance laboratories. This source of confusion is a high concentration of potassium iodide. Potassium iodide in the right concentration gives rise to a ring when nitric acid is added which many might mistake for albumin ring. The test is probably due to the presence of phenol products in the urine which react with iodine when the latter is set free by the nitric acid.

At all events, a quantitative albumin determination is manifestly just as essential as quantitative sugar determination in the examination of urines for life insurance.

The albumin determination adopted by the committee is almost as simple as the nitric acid test except for the necessity of using known albumin standards for comparison. The standard is simply a serum solution diluted with 15 per cent. sodium chloride solution. As Dr. Knight has agreed to print the description of the methods for both the sugar and the albumin, it is not necessary to discuss the albumin method here in any great detail and I will simply show how it is carried out. The method, like the one shown last year by Dr. Exton, depends on the precipitation of *all* the albumin in the urine by means of sulphosalicylic acid and measuring the cloud or turbidity obtained. Dr. Exton used a special instrument for measuring the turbidity in order to get away from the need of using standard albumin solutions for comparisons, as was done in the original method of Folin and Denis. In the method as here used, standards for comparison are still employed, but no colorimeter or other special instrument is needed. The process

is so simple and expeditious (ten or more urines can be done simultaneously) that it ought to prove adequate to all practical needs in the way of expressing the albumin contents of urines in terms of definite percentages. The test is free from all of the sources of confusion met with when the nitric acid test is applied. It is hoped therefore that this method or some suitable modification may be universally adopted in the home offices of insurance companies.

Dr. Grosvenor—I think the Association is very deeply indebted to Dr. Knight for providing the means and to Dr. Benedict and Dr. Folin for giving us their time this morning. We will call upon Dr. Exton to open the discussion.

Dr. Exton—I should like to say, Mr. President and Gentlemen of the Association, that I regard it a distinct privilege, not only to be here, but to be invited to discuss these papers. Both of the gentlemen have names to conjure with, and I know that there are many chemists who would esteem it a great privilege to see these two great chemists in the same field. I feel sure that their association with life insurance is going to help get things done which I have been trying to do ever since I came into life insurance from clinical medicine.

I am going to run right along trying to cover a few of the points that have been brought out.

Firstly, we got to the point that Dr. Knight has just reached about seven or eight years ahead of him; that there was much confusion and nonsense connected with the urology of insurance was easily apparent to one trained in clinical medicine and also there was too much importance placed upon statistics which meant nothing. That is why I have refused time and again to give out any figures from our laboratory when they have been requested. Thus, even the question of centrifugation for casts has not been standardized, and one can put very little stock in many M. I. B. reports, because, as I have said before, they do not always mean the same thing to everybody.

We have quite a few insurance problems awaiting solution. For instance, Dr. Benedict touched upon the question of preservative. That is a very important matter; in fact, the first

run-in I had with my medical directors was on that very proposition. There was in use a substance which no one knew anything about, called chinosol and there was boracic acid made up in tablets without an excipient. They were used as a preservative; but had the very serious defect that they did not preserve, and it was not always a pleasant matter to explain that specimens should be thrown out and no time wasted on them because they were unfit for examination or for passing any opinion as regards chemical and microscopical content. I do hope you will get at the matter of preserving urines right away. It is indeed the most important single problem that we have to contend with at the present time.

Now with reference to Dr. Benedict's new test, it seems sort of ironical that he should have brought out a new test when I had not quite completed the propaganda to replace Fehling's and Haines' with his qualitative sugar test. As you know, I have been recommending this in preference to other tests ever since I was privileged to be among you. We are still using it. I think you will all agree with me that if it were not for diabetes, we would not be making any sugar tests at all. I will not say that the proof is conclusive by any means, but from my own personal standpoint I am ready to go ahead on the assumption that diabetes is essentially a disease of glucose metabolism, and it means a great deal more to me to know that there is glucose in the urine than what percentage or other different kinds of sugars I may find in the specimen. From a life insurance standpoint I think the specificity for glucose is the real crux of our sugar problem and that we should be working towards a specific test for glucose, if such a thing is possible, which appears not to be the case. I am quite certain that the picric acid mixture is not as specific for glucose as the copper test, and we, therefore, continue to use the copper test. Ever since Dr. Folin introduced Lloyd's alkaloidal reagent, we have been shaking out the questionable specimens with that and making the copper test on the unshaken and shaken urine and found it helpful. Thus, when you do a qualitative Benedict's test, if you get a real sugar reaction it does not worry you;

and if you do not get any reaction at all it does not worry you. There remains however about 10% or 12% of the specimens in which the reactions are indeterminate, and these are the ones that worry the medical director. Shaking these out with Lloyd's alkaloidal reagent and making the test with the filtered urine we find we are able to cut down these indeterminate urines which worried one to perhaps about one or two per cent. and the same thing is done in connection with the Phenylhydrazin test, in which it is especially helpful.

In connection with Dr. Benedict's test the question of adding just exactly the amount of acetone is extremely important, and it seems to me that such tests should always be done in duplicate. In any event, we would not be able to use the test in our laboratory because we use formalin as a preservative and that gives a color with the picric acid mixture. I think, however, that both of these tests are very clear.

Now with reference to Dr. Folin's test. When I came into life insurance I found that the nitric acid ring test was a sort of "noli me tangere". In clinical work I had not been using the test for years, but it is such an elegant and time-honored test that I never felt quite ready to make serious propaganda against it. We have always used some other test in connection with it. I can verify what Dr. Folin has told you about the deficiencies of the nitric acid ring test and tell you others that he has not mentioned. Thus, using clear ascites serum of known albumin concentration, we tested out the sensitivity of Heller's test and found it to be about 1 to 26 or 28 thousand. We then took a variety of albumin-free urines and added to these definite amounts of the serum and found that with these urines Heller's test would sometimes fail to give a definite reaction in dilutions of 1 to 12 thousand parts of albumin. This taught us that in dealing with a series of specimens, even if you made Heller's test under the most perfect conditions, you were only fooling yourself in drawing conclusions as to the apparently same reactions denoting the same amount of albumin. In addition to being misleading in a quantitative way, it has other objectionable features.

This test of Dr. Folin's is clever. It has, however, some very serious objections, in my estimation. Some years ago, in a clinical study of albuminurias, I was led to the conclusion that the degree of dilution of a specimen was a matter which should always be taken into consideration in estimating the significance of albumin and developed a formula that takes this into consideration in connection with the amount of albumin, so that if you get from a man one day a 1023 specimen and the next day, a 1014 specimen, you have a criterion which will tell whether the albumin ratio in these specimens is about the same or not. This work has been confirmed by Dr. Russell, of Aberdeen, who published a very painstaking method going into the same subject, in the Quarterly Journal of Medicine. I have likewise received confirmation from clinical sources other than this in personal communications lately. I think this will ultimately lead to a new gauge for estimating what we have been calling intermittent albuminuria and persistent albuminuria, possibly a new classification which will be helpful. Certainly the output of albumin in some forms of nephritis is constant when estimated with reference to the degree of concentration of the specimen.

Now this test of Dr. Folin's, I take it, was intended to run along with Heller's test, and if this be the case I should judge this sensitivity to be about 1 in 25 to 28 thousand parts of urine.

Dr. Folin—You get positive tests with about 300 of 1%.

Dr. Exton—That is about 1 to 30 thousand parts. We have several other criteria which we use in determining the significance of albuminuria, and I think it is a mistake to use a test that is not more sensitive than Dr. Folin's. It is certainly not a clinical test, and if used will close the books as far as insurance experience goes, and preclude our learning what we need to know about albuminuria. Small amounts of albumin are of particular significance in low gravity specimens. As Dr. Folin has not seen my instrument for estimating these clouds, he will find out when he does see it that it takes particular care of the very point he raised. In fact, my particular point is that the standards which are now in use in his and

other quantitative methods are not really standards at all, and this led me to make the investigations which resulted in the invention of the instrument. I might also state that Mr. Brockett, of the Eastman Research Laboratory, has produced for us a set of tubes making very good solid standards by using gelatin and a precipitate of barrium oxalate, which are suitable for rough work. We have also sets of standards made with our reagent and serum of known albumin concentration which have been sealed for two years and show no change.

Just another word about both of these tests. We must have tests by which we can check up the work of our examiners, and neither of these are tests which can be put into the hands of an examiner. They are not good enough for laboratory tests and not simple enough for field tests.

Dr. Weisse—You spoke of low specific gravity. How low do you mean?

Dr. Exton—I should say down as far as 10 or 12.

Dr. Grosvenor—Dr. Balch will continue the discussion.

Dr. Balch—I regret very much that I came in so late that I heard little of Dr. Benedict's paper, and I could not hear, sitting in the back of the room, very much of what Dr. Folin said. What I have to say will, perhaps, be superfluous, but I would like to tell you a few things about our practical experience with the tests that have been shown here. I did not expect to speak and have no data with me.

We have probably examined about 15,000 specimens in the last six months, in my laboratory—one of the two Metropolitan laboratories—by these methods. We have not made any very great number of comparisons with the older methods, but we have made some comparisons.

In the first place, I would like to say just a word about the remark of Dr. Folin with regard to getting the two laboratories together. We have had two laboratories, and I have had charge of one of them. Six years ago when I came to the Metropolitan Company, I found these old methods in vogue—one, Fehling's method, was in use when I was a youngster in Medical School, some twenty-five years ago. During an insurance experience

of nine months, I found that these old methods were still in general use in insurance laboratories. They were antiquated and obsolete. Not only were the methods antiquated, but the conclusions drawn from the results of use of those methods were so completely out of date that I lost all sympathy with the whole problem and resigned. For some reason or other, I was offered my own laboratory, and there seemed to be some prospect of modernizing methods and also making use of better methods of recommendation regarding disposition of cases.

Dr. Folin said that the two laboratories should have been brought together. How under the sun you can combine black and white and expect to get any definite color out of it, I cannot understand. The two are absolutely opposed. I wanted to adopt modern methods. The other side of the question was "absolutely no change whatever. We must stick to Fehling's solution. We have always done it that way and always should."

The laboratory people in our Company make recommendations in regard to disposition of cases as well as doing laboratory work. The old method was to postpone for six months, or reject, everything that showed any crystalline material at all in the phenylhydrazine test for sugar, or the smallest reduction with Fehling's solution. This was the most arrant nonsense, of course, and yet it was the old way of doing things.

When my laboratory was organized five years ago, we began making changes. Dr. Folin said, if I understood him correctly, in these years we have accomplished nothing. We have accomplished tremendous results. We have modernized methods, so far as it was humanly possible, with every effort that could be made, sometimes against the most bitter opposition. When I was able to get a colorimeter, I adopted the Benedict-Osterberg method for quantitative sugar. In 1921 Benedict and Osterberg published their later method for sugar determination, and I think it was two days after the article appeared that we began using that method. Certainly some progress. Incidentally, in the way of progress, I may say that the changes in the method of recommending disposition of cases that showed small quantities of sugar gave us, in the first year,

a saving of $800,000 in business. In the second year, the business saved amounted to over $2,000,000, and in the third year the sum was also over $2,000,000. This is just the briefest sort of survey of the changes that we brought about. Dr. Folin, of course, had no means of knowing these things.

Dr. Folin also said that it was a waste of time doing absolutely the same work in the two laboratories. As a matter of fact, the two laboratories are doing as different work as it is possible to conceive. The recommendations are entirely different. We have been using the old Fehling's solution because I could not help it. It was the official method and I was obliged to use it.

(Time being limited, Dr. Balch was unable to discuss the results of analyses by the methods of Drs. Benedict and Folin.)

Dr. Ward—I understood Dr. Exton to say that these tests could not be used by the examiners in the field. Is that the opinion of Dr. Benedict and Dr. Folin?

Dr. Grosvenor—Will Dr. Benedict and Dr. Folin close the discussion?

Dr. Benedict—Dr. Exton brought up the point of a specific method for glucose. Of course glucose is the sugar of paramount interest in the urine. It is at present impossible to outline any method that is limited in its results to glucose. We can depend only on the reaction which is given in common by reducing sugars, and the border-line cases, showing larger amounts of sugar, will practically invariably show some glucose by the tests proposed, so that there is nothing at the present time to be done but to depend on such tests for border-line reaction.

In regard to Dr. Exton's proposal of clearing urines for the qualitative copper test, I would say I question much the feasibility of adopting any such procedure. If you precipitate the urine first with phosphotungatic acid, you can get 100% of reaction in the filtrates with my solution, because the sugar is there and you will remove the interfering substances. If you clear with Lloyd's reagent you will get a somewhat smaller percentage of normal urines that will give a perfect reduction.

I do not believe that the clearing proposition is worth going into in connection with the sugar determination.

In regard to the question of the use of this method for formalin preserved urines, I would say that formalin is not a satisfactory preservative for insurance work. It reduces Fehling's solution itself. The amounts have to be very closely limited and formaldehyde in reasonable amount does not affect this reaction appreciably. In large amounts it throws out everything and is not a preservative that should be adopted.

In regard to the examiners we have not taken up that question as to whether they can adopt such a procedure. It is a question that must be worked out from the practical side. You have got to begin at the Home Office and extend as you find the capacity to exist for extension in insurance work.

Dr. Folin (closing)—I think I ought to say just one word in reply to Dr. Balch. I think he misinterpreted my remark about having accomplished nothing. I did not imply that they had not tried to use the results used in other laboratories outside of the insurance companies. I mean constructive research work that adds to the general knowledge.

With regard to the sensitiveness of the sulphosalicylic acid test, it is every bit as sensitive as the nitric acid test which you have depended upon and is free from all known errors inherent in the nitric acid test. Therefore the question of the degree of dilution does not come in, especially as you must remember that in our scheme we hold in reserve a research department where all special questions, all debatable questions, will necessarily come in for far more detailed investigation than they have ever received in the past.

Now with regard to the use of these methods by the general examiner—I leave it to yourselves whether a person can measure out one cc. of urine. Does that seem to you a very difficult thing for you to do? I think the only thing they would not readily be able to do would be to have the standards, but they do not need the standards. They will make better guesses as to the amount of albumin on the basis of this test alone than they possibly could on the basis of the nitric acid, but the

matter of providing for the general examiner is one which we have as yet considered only to a very small extent.

Dr. Grosvenor—We will now have the discussion of Dr. Eakins' paper—"The Medical Director". I have tried to prevail upon Dr. Eakins to read his paper but he feels that there is so little time left and so many papers still to discuss that it would hardly be fair to take up the time of the meeting in reading the paper. Dr. Willard will open the discussion.

MEDICAL DIRECTORS.

By O. M. Eakins, M. D.

Medical Director, Reliance Life Insurance Company.

We have heard much about the A.B.C.'s, and down the alphabetical list of impairments, from albumin, build and colic to zygomatic fractures, and zymurgy. Some of the M's have had scant attention. Among those neglected may be mentioned myelocone, and Medical Director, which impediment, laboring occasionally under the appellation of the "Great Obstructionist," is looked upon by some eyes as being in the nature of an impairment.

For perhaps fallible reasons our President considers me an expert on unscientific subjects. Complying with his order to submit a paper at this meeting, and acquiescing with his insistent injunction to avoid anything seriously scientific, I am impelled, with his responsibility sharing concurrence, to utilize—or waste—a little printer's ink on us, the much-maligned yet well-beloved Medical Director. Some of my comments may appeal to your serious consideration, others are intended for your delectation only. It may be venturesome for me to attempt to tell some of my elders what they are or should be. I wonder whether a Medical Director has the privilege of being human, and whether there should be a humane side to his position and office. I wonder whether he is without privilege and is a mere machine who can only thumb up the total of several figures, giving the summation thereof. I wonder whether there is any

personal equation permissible in the performance of his duties. I wonder whether his individual opinion is sufficiently omnipotent to alter a fact. I wonder whether it is sound business for a company to gamble on his opinion as a good guesser, rather than to insist upon having the advantage of known averages. Realizing that my predilections might bias my judgment in discussing him, I have consulted with able Medical Directors, Executives, Actuaries, Agents and Outsiders. In visualizing him I am indulging in a composite photograph. Please look upon it in the spirit in which it is presented. Admire the complimentary features with unction; retouch, smile at or reject any harsh lines as not pertinent, or impertinent if that is your pleasure, or possibly assume them to be due to an imperfect lens in the hands of an indifferent photographer.

Anonymous contributors have laid the following eggs which, on attempted poaching, do not redound particularly to our credit:

1. The Medical Director
   Is the Argus-eyed protector
   From the daily raids of old Mortality.
   He's a Hound for flaws, by Hector;
   He's a Star as a Rejector
   And from afar can scent Rascality.

* * *

2. He has bats in his belfry that flut,
   And his comprenez vous chord is cut;
   There's nobody home
   In the top of his dome
   And his head's not a head, it's a nut.

Black malignancy and atrocious malevolence prompted the birds who ovulated those mockingly outrageous caricatures. A more kindly spirit was behind him who contends that:

> To the Policyholder of a Mutual Company, he is the "Tiler of the Lodge" whose duty it is to see that only those

enter who have the password of good health and "who are under the tongue of good repute."

To the Owners of a Stock Company, he is the "Watch Dog of the Treasury" whose duty it is to see that only those are allowed to deposit gold therein who are direct descendants of Methuselah, who are immune to all the ills of flesh and who bid fair to bury him and all the children of the stockholders.

To the Agent, who lives by his sales, he is a Nuisance because he is totally ignorant of the Laws of Life, in league with Satan to deprive him of his just reward; a Superfluous Official that time and custom has handed down as an incubus and parasite on the "body politic" of Insurance; an erring Individual whose soul the Agent knows he will never see in Heaven.

To the State, he is a most Useful Citizen because he partly sees that the social and economic progress of only the strong is increased, by giving them the benefit of Life Insurance for their offspring.

To the Average Man, he is a "Dispenser of Good Cheer" because he bids him to carry on with his labor of love, with the promise of protection for the inspiration of that labor should Fate decree the necessity.

To Himself, he is a Just Judge, leaning always to the side of Mercy, visioning daily the outstretched arms of wives and children who may be rendered helpless by his decision, knowing that he is more than a Legal Judge who punishes only the guilty, in that he must condemn and punish only the weak and innocent who are not even allowed to appear in their own defense: a Man, "majestic in his sadness" at the frailties of humankind, who takes to his bed every night the thought that he was unable that day to aid a potential widow to lift the mortgage from her home and to educate her children for lives of usefulness, and yet who "carries on" day by day performing his task as best he can, faithful to the Lodge whose portals he guards or the Financiers whose interests he protects.

A Medical Director may also be defined as one who can say "no" or "yes"; can say either with cheering firmness, with impunity and with success: "No" to the Agent who accepts it with smiling satisfaction; and "yes" to the Company which raises no objection. One who continues making decisions which are not changed by, and are entirely satisfactory to, his Executives. One who can, with profit to his Company, remove some of the old barriers from the pathway of Applicants seeking insurance; and one who knows what barriers should be erected, and erects them. Dr. Muhlberg has suggested to us that "the skillful Medical Director is the man who can safely pull down some of these barriers, if possible, and permit people to get insurance." Parallel suggestions are Dr. Dwight's comment that "that Medical Director is the best who enables his Executive Officers to control mortality with the least proportion of declinations and at a reasonable expense," and Dr. I. B. Hall's "that our work has been best performed when the declined percentage is low." The removal of barriers has its parallel in their erection. Might I venture the suggestion that a Medical Director, to be a success, must also be one who can hold a bridge, which he knows should be held, against all assaults! Nor does it matter whether those assaults are pleadings, threats, high pressure, imaginary expediency, alleged competition or fancy polemics.

It is axiomatic in the legal and medical professions that an attorney who pleads his own case has a fool for a client, and the physician who treats himself has a badly advised patient. We should have an axiom such as: The Medical Director who interprets his own examination has a complacent personality—to say nothing of his being a sincere egotist. It is a brave artist who accepts his own as the final judgment of his work. Bankers prefer their personal estimate of the sufficiency of collateral, to that of the individual borrower. Eminent physicians and surgeons are not averse to having a Roentgenologist interpret an "X-ray" plate, nor do they entirely waive the pathologist's aid. A pediatrist is much the better judge of an infant than its mother. Because of a belief extending back over many years I have persistently refused to examine an

Applicant for the purpose of removing a rating, when I also had to determine his value as an insurance risk. It is assumed the Applicant had already been examined by a competent Examiner and the rating assigned to cover definite factors. The belief prompting the refusal is based upon the unsoundness of the principle involved, the assumption that a personal opinion spells finality. I believe that any opinion is worthless when opposed by a proven fact. An opinion does not qualify, socially, to break bread with a fact. The accurate weighing of opinions is a fine art and requires in its operation delicate balance scales. The grain of salt added to one opinion may be the determining requisite. The decision to which opinion the salt shall be added is one feature making of the art a fine one. Dr. Dwight intimated that impressions and guess work are far from efficacious; nor is their accuracy comparable with the results obtained by "a good man with good tools," good tools being proven facts. One of the unwritten laws of my office is, the man who examines a risk shall not also value its insurability. The object of that rule is to prevent impressions and prejudices from influencing his advice to the Company. "If you could only see the man personally!" "May I not bring him into the Home Office?" "I'll pay your expenses out here." You know the changes, both legitimate and sycophantic, which are rung on those quotations and the hope which underlies and prompts them; the hope that the personal equation, the favorable impression, will offset some fact and warrant the issuance of a more liberal contract than that first offered. How many of us are free from the possibility of going wrong on our impressions? Let us assume two cases: An individual is brought forth to be examined and I, or you, examine him personally. The man has a history of X. It was Y years ago. He is an intelligent individual, he bathed this morning and his shirts, both of them, are clean. He has a twinkle in his eye, and not only the wrinkles at the corners of his mouth, but also his speech, reflect his sense of humor. He radiates personality and he pleases me, or you, much. Our impressions of him are very favorable and we write him down as being better than his class

and advise our Company that his rating is 125 instead of the 150 which is written in our good tools chest. Later, another individual is produced for examination. He also radiates personality, as do his shirts. His several recent baths were sadly neglected, or overlooked entirely. His mouth wrinkles, and his speech, label him as a supreme grouch and he annoys me, or you, much. He has a history of X, Y years ago. Our impressions of him are better left unsaid and we advise our Company that he is worse than his class, that his rating is 175 and not our tool chest 150. Conceivably, the first man may be so good-natured he would laugh at and fail to consider seriously a contracted illness, and, quietly and smilingly, he passes out. The other, with the same affliction, very likely would call up his grouch, fight like a catamount, and be too mean to pass out, or even smile at remaining. Admittedly over-drawn, but are we, if we do such things, good men with good tools, or are we asking our companies to gamble on us as good guessers? Certainly an injustice has been done to one or the other of the individuals, and to the Company, which means to the rest of its policyholders. For we have permitted the personal equation, we have permitted impressions, to outweigh facts. We do it unconsciously, perhaps, but we arrive at divergent conclusions concerning two individuals who are exactly alike in their insurability classification. We offer the privilege to one to enter a class in which he has no right, and we refuse the benefits of consistent insurance to the other who needs it and deserves it.

I believe it is the custom of many Medical Directors to permit themselves, or their Home Office representative, when "out in the field," to examine a host of Applicants for reconsideration. Of course, most of these risks are hand-picked by those interested, who consciously or unconsciously believe that the favorable impression created will get the risk by. The psychology of the matter is, the Agents are right. The risks do get by, and another "hunch" has gone on the books. The good man has neglected his good tools to play an impression. Very often he congratulates his Company and himself for having saved or acquired some good business. If we could only

study such groups in the light of percentage mortality, I imagine that such self-administered back-patting might not be quite so enthusiastic. I merely venture an assumption; I am not sure. I do say, though, that it is a highly dangerous procedure to discard good tools, the accuracy of which is known, for impressions. Most of our impressions grow up from our subconsciousness, where they were planted by our conscious intelligence. They are seedlings of our experience. Assuming the impressions to be accurate, if our conscious intelligence were in control it might not be so bad. But most of such work is done hurriedly, under pressure, with all possible favorable elements emphasized, and our conscious intelligence is given little chance to assert itself. The result is far from a judicial decision, but is rather a subconscious snap-judgment based largely upon prejudiced evidence. All of us have had more or less experience, and intentionally and unintentionally both its accurate items and fallacies have been impressed on our subconscious minds for future reference. Let us not permit many of our apparently intelligent mental operations to be so influenced by some of our subconscious tabulations as to be not at all intelligent. Such practices inevitably lead to paradoxical judgments, inconsistent rulings and material waste. With those results accomplished, there can be no doubt of the Virginia paragrapher's comment that "Barnum's contribution to the vital statistics was singularly free from error." Dr. Dwight correctly affirmed that a Life Insurance Company is short-sighted "which expects a reasonable mortality effectively and economically furnished by a method of selection based upon impressions and guess work." Impressions should be based upon facts, but frequently what are supposedly facts are, in reality, illusions based upon impressions.

Consistency, not pedantic obstinacy, has been variously described as a virtue and a jewel. There may be numerous vagaries which are more absurd than inconsistency, but it is sufficiently ridiculous to prompt any Medical Director to make a sincere endeavor to eliminate it from his kit. And yet ex-

amples of the daily inconsistencies in which we indulge could be cited in numbers. Three will suffice:

1. Different actions taken on exactly similar Applicants.
2. Unjustifiable reversal of actions, capitulating because of a tearful or forceful plea, because of competition, because some other company was more liberal.
3. Rigidly severe on Monday and liberally generous on Thursday: Positively certain in January and waveringly uncertain in July.

1. Different actions on similar Applicants are usually buried, unknown and forgotten, in the files. But, when they occur on Applicants of the same Agent, he is usually inclined to indulge himself in a series of exceedingly embarrassing questions. Rather, his questions are pertinent, but the finding of satisfactory answers is perplexing. The manicuring of a Mule is usually recognized as a hazardous undertaking, but it is no more so than many controversies into which a Medical Director is drawn. He is not liable to be catapulted through the shed wall, nor to have his ribs crushed. He must, however, indulge in very active, protective, mental gyrations when engaged in conversation with some of the Temperamental Hallucinaries who constitute the Nerve Complex of his Company. A mental slip or oversight, and he is figuratively trampled upon and bitten, or kicked at from unforeseen and unexpected angles. A Mule has an uncanny memory of his few joys and, once having landed, is ever looking for another opening. An Agent who has once tasted the blood of a Medical Director is left with an insatiable thirst. Soothing the ire of a thoroughly ruffled Agent, when fortuitously achieved, is at least worthy of commendation as a difficult task accomplished. Different actions on like Applicants, with their subsequent potential embarrassment, may very readily, and may only be avoided by consistently following well-defined rules and by not making snap-judgments, nor voicing conclusions without full possession of all the facts.

2. All of us who are free from smugly satisfied certainty, are very glad to reverse our actions when presented with addi-

tional pertinent facts. But if we retreat, and reverse, because of a plea only or because it is the easiest way out, we have joined the "Acquiescing Sisters" for the members of which family, too spineless to say "no" or too indifferent to advance by hewing a new trail, crape should be surreptiously worn.

3. Rigidity or liberality in selection should be dependent upon very clean-cut factors and standards, rather than upon the time of day or week. Unfortunately it is occasionally true that an unhappy breakfast, or a badly adjusted carburetor, is the Djinn determining rigid selection, rather than definite standards or good tools. Our Executives may not be very sure of us if their memories go back from July to January, or from October to May, and they remember that, without any very valid or apparent reason, a fish became a fowl and flesh developed into a red herring. Many Executives for years have studied, without absorption, the ways of Actuaries and the means of Medical Directors. If we find during the first three months of the year that our "mortality" is running considerably higher than our average, and an Executive at the end of the year also isolates that chance happening, it matters little to him or to any one else. But if, in his browsing, he also becomes cognizant of the untoward phenomenon that his Company's percentage of rejections during April, May, and June suddenly jumped upward, he might entertain a perfectly tenable opinion that there was a coldness of his Medical Department's sunken tarsi entirely unwarranted by the seasonal temperature. He might even assume his Medical Department was not familiar with the way variations of new net insurance and mortality percentages have of see-sawing with each other. His imagination might carry him further, to the conclusion that his Agents and their Applicants had been meted out rather scant consideration for that period; that the Company had lost, entombed in the rejection list, some very good and very valuable business and that the benefits of insurance had been withheld from the deserving. The various items of cost of those declinations occur to him. If he inquired into the reason for such a high rejection percentage, it might or it might not be possible to give him a satis-

factory explanation. "That Medical Director is the best who enables his Executive Officers to control mortality with the least proportion of declinations and at a reasonable expense"; and, he "who can control the mortality of his Company with the greatest possible economy" is certainly not the man who vacillates between days and seasons, and who is on a constant search for a cloak with which to cover the nudity of his excuses, or who carries in his soul the knowledge of crimes for which he can not atone.

Accountants and Bankers, Lawyers and Physicians, all have a more or less solid foundation of basic principles upon which to erect the superstructure of their life work. The character of the superstructure will be what they are able to make it. It may reflect the age-enduring qualities of the Pyramids, the glories of the Taj Mahal, the dignity of St. Peters, or the horrors of Quackery. But their foundations were identical! What foundation had the profession of Medical Directorship upon which to build? At first, a medical education from which general deductions were drawn, frequently with the certainty of error. Practically all of us long ago decided not to go to Clinicians, however expert, for information or opinions covering insurance values only. Later, the deductions were qualified by results and many erroneous conclusions were eliminated. As time wore on, experience increased and we came to have some good and some bad impressions and more results and still more facts. Latterly, we were given the Medico-Actuarial study which is now our foundation. It is not only that, but it is a sound foundation upon which we may safely build. Our superstructures will be what we are individually able to erect. Our thinking must be straight, our imaginations must be keen, our ideals must be exalted and our reasoning must be sound. We must bend our every energy to the arduous work of preparation —familiarity with our tools—or we face the inevitable realization of our inferiority. If we are sufficiently competent, then we build that which will successfully withstand, however searching, the inquiries of the present and the criticisms of time.

DISCUSSION

Dr. Willard—It is to be regarded as unfortunate that the discussion of Dr. Eakins' paper must be made without having heard it read by him. The value of the discussion, it seems to me, is impaired by not immediately following the presentation of the paper before us all. We are always prepared to compliment anything Dr. Eakins does for us and this time is no exception. On every side I have heard complimentary remarks about the wonderful diction, display of great erudition, the selection of the apt word and the delightful humor that has permeated it all, but Brother Eakins does not want to be complimented (in fact he told me so) and so I suppose we must criticise him. My criticism is that he did not give us as much as he might have done. There was a great opportunity for him to make even a greater display of his wide reading than he has already done. These are days of outlines and condensed histories. We have the Outlines of History by Wells. We have the Study of Mankind by Van Loon and now Drinkwater has compressed the History of English Literature into a single volume. It would have been an interesting picture to spread before us of the gradual climbing up from savagery of the medicine man, and the fakir, arriving finally at historical times when the pompous and dogmatic doctor could have been described in the Doctor's inimitable style. Finally the doctor gets into life insurance and there he finds he has to give up some of his dogmatism, some of his "say-so" and "believe so" and must take an entirely different attitude than he took hitherto which was, "When I ope's me mouth, let no dog bark."

All of us remember some Medical Directors of the olden days who simply did things because they did them and they knew they were right and there was nobody to say them nay because nobody kept tabs on them by statistics. The statistics have come to be the doctor's aid as well as his correction. They have brought him around to reason and to his credit be it said there is no body of men that has appreciated this fact more than this Association, as witness the work that has been done

in conjunction with the Actuaries. Therefore I regret, I say, that Dr. Eakins did not view his subject from this historical angle.

What he has said about the personal equation appears in our business every day and the two speakers on the chemical subject today were talking about the interpretation of the same set of facts by two different people and there has always been a certain amount of the personal element in the decision of cases and lots of fun has been poked at it, but there will always be a certain amount of it. Some Directors have learned to minimize it to an appreciable extent. In this connection I am reminded that about twenty-five years ago, in 1899, to be exact, I was in England beginning to study the subject of impaired risks. My companion and myself had letters to an insurance company in England that had for sixty years been doing business with substandard risks. There were fifteen Directors of the Company, seven of them medical men, and the candidate was required to appear before them and be subjected to their questioning. They had but one agent in their employ who was located in London and they told us that when anybody failed getting insurance he would come to that agent and his application was submitted to them. They had had three periods of twenty years each of experience and with the premiums they charged and the ratings they made, they were able to keep along, be successful, and declare at the end of each period very substantial dividends. I asked to see some of the cases and was furnished with a lot of material written out on great, long sheets. I found quite a number in which the stated facts of two or three cases would be identical and yet the decision reached by the Board of Directors was different in each case. In one case they would add five, or ten, or fifteen years to the age, in another they would increase the premium or change the plan, and in the third they might impose a combination of penalties. I talked with one of the Directors who had been with them many years. He was Dr. Lionel Beale who was one of the early authorities on the uses of the microscope. I asked him, "Why was it you made different rulings and came to

different decisions in these three cases where the facts are identical—same age, same family history, same impairment, same everything else? In one case you did one thing, in the second case you did another and so on." "Oh," he said, "I couldn't tell you." "Well," I said, "You must have had some reason." "Perhaps," he said, "But if I could tell you that I could tell you what was going on in our minds fifteen or twenty or forty years ago when these people passed in review."

I give you this to show you that this Company, with its methods in which the personal equation was so pronounced did get along and did fairly successful business.

The culminating point in the education of a medical director comes when he has the opportunity of joining the Association of Life Insurance Medical Directors. He will be a better director, a better doctor, and better serve his company after he has joined this Organization which radiates friendship and shares the knowledge possessed by all. It is a clearing house of information for the benefit of all who are engaged in this business and it stimulates inquiry and research which as time goes on will be more and more important.

Dr. Grosvenor—We all greatly regret the absence of Dr. Symonds because of ill health. He has I believe written a few words discussing this paper of Dr. Eakins, and Dr. Porter has kindly consented to read what Dr. Symonds has written.

Dr. Symonds (read by Dr. Porter)—The Gentleman with a Medical Duster has held us up to the Looking-Glass of Nature. Is the mirror distorted? Is it convex or concave? No, it seems to be a plane mirror, but even that makes the right hand left and the left hand right. If you stand up and look into a plane mirror which is tilted forwards, your head seems as big as a pumpkin while your "understandings" may disappear out of sight. If the plane mirror is tilted backwards, the feet are as large as elephant's and as firmly planted and the head is the size of a hazel nut. Perhaps that is the way the agent regards us while we may be viewing ourselves in a mirror that is tilted forwards. The angle of view makes such a difference.

How finely Dr. Eakins sketches the evil influence of the

cases that are brought for reconsideration, either in the field or at the Home Office. And yet he can be assured that his portraits are as accurate as they are vivid. Recently an analysis was made of some cases, many of whom had been re-examined on appeal by a set of examiners than whom there are none better in this country. Yet the mortality was 50% higher than the company's average. A smaller set of cases, on many of whom the original decision had been modified or reversed, showed 7 deaths, too few perhaps for a convincing argument but twice as many as there should have been. And now in the cool blue empyrean, long after the hot conflict of wistfulness, desire and appeal, how funny the successive decisions on the record of such a case seems.

1st.—Declined.

2nd.—No. Has limit.

3rd.—Reconsidered and approved. Full limit.

4th.—Additional approved. Full and absolute limit.

It makes one think of the tea-party which Alice shared with the Dormouse, the Mad Hatter and the March Hare. You remember it.

"Have you guessed the riddle yet?" the Hatter said turning to Alice.

"No, I give it up" Alice replied, "what's the answer?"

"I haven't the slightest idea," said the Hatter.

"Nor I," said the March Hare.

But Dr. Eakins very wittily tells us why we change our minds in some cases, though he has not touched upon the problems of the "Eminent Specialist." The diagnosis of the "Eminent Specialist" is usually acceptable at its face value but his opinion of insurability is worthless. The fact that his lesion will cause 20 deaths per 1,000 instead of 10 means nothing in his bright life for he will point to the 980 survivors and say that is close enough to 990 for all his purposes. In fact he may get peevish and insistent that 20 deaths instead of 10 signify nothing to life insurance and there he reminds us of another interview of Alice, this time with the White Queen. You remember it.

"Now I'll give you something to believe," said the White Queen. "I am just one hundred and one, five months and a day."

"I can't believe that!" said Alice. "Can't you?" the Queen said in a pitying tone. "Try again: draw a long breath, and shut your eyes."

Alice laughed. "There's no use trying; one can't believe impossible things."

"I daresay you haven't had much practice," said the Queen. "When I was your age, I always did it for half an hour a day; why, sometimes I have believed as many as six impossible things before breakfast."

Medical Directors have much practice in believing the impossible for every agent thinks his declined ducklings are swans and tries to convince the medical director. Sometimes the requests are so void of merit that the Medical Director feels like the Dutchess when she said to Alice:

"Speak roughly to your little boy
And beat him when he sneezes;
He only does it to annoy
Because he knows it teases."

But why should anyone try to paint the lily or gild refined gold? This paper of Dr. Eakins is a gem, a peach, a lallapaloosa. Those of us who played poker before bridge was invented to part us swiftly from our money know that a lallapaloosa wins above any other hand but it can be played only once in an evening, and Dr. Eakins has already held it at this annual meeting.

Dr. Grosvenor—Dr. Eakins' paper will be further discussed by Dr. J. W. Fisher.

Dr. J. W. Fisher—Dr. Eakins, in his paper, raises the doubt as to whether the medical director has the privilege of "being human"—"whether there should be a humane side to his position"—"whether there is any personal equation permissible in the performance of his duties"—"whether it is sound business for a company to gamble on his opinion as a good guesser,

rather than to insist upon having the advantage of known averages," etc., etc.

Let us endeavor to determine what should be the functions of a well-organized medical department and its relation to a life insurance company.

First—It is self-evident that the medical director should carry out, to the best of his ability, the policy of the company as formulated by the board of trustees and the executive officers, as relates to mortality desired, and especially in a mutual company, should endeavor to select risks without undue mortality fluctuation of one class over another.

Second—To conduct risk selection in such a manner that there will be a minimum of friction with the agency force of the company. Too much stress cannot be laid on this phase of the duties of a medical director, as a well-organized, contented, enthusiastic, loyal agency force is one of the major assets of an insurance company, and we, as medical directors, have reason to know that risk selection is liable to contribute vastly more to discontent on the part of solicitors than any other department of a life insurance company.

Third—An exceedingly important function of the medical director is the selection, supervision and training of the local medical examiners.

Without discussing further the functions of the medical director and his department, let us consider how the desired mortality may be secured to the best interests of the company as a whole. To accomplish this, to my mind, the most important factor is to gain the confidence of the Home Office management. When this is accomplished, the medical director's burden is greatly simplified. The most important factor in establishing this confidence is the securing of facts upon which the medical director bases his rules governing risk selection. When it can be demonstrated that these rules are based on facts shown by the experience of the company and that of other companies, and that the results from year to year, secure a satisfactory mortality, the management is thereby relieved of a great burden. Having the confidence of the management is

a great aid in securing the confidence of the agency management and of the solicitor in the field. If the management is sufficiently impressed with the efficiency of the medical department, to the extent of being convinced that the department is more capable of deciding all questions of a purely medical nature in risk selection, than any other factor in the company, and is willing to see that no other officer of the company, or any committee, shall override the decision of the medical director, a humane, conscientious, competent medical director will experience little difficulty in securing the confidence and co-operation of a reliable, intelligent fair-minded agency force, and there will be a minimum of friction between the agency force and the medical department.

The medical director should cheerfully review all rejected cases, at the solicitation of the solicitor, when additional material facts are presented, and if the medical director is unable to demonstrate that such additional facts are not sufficient reason for a reversal of his previous decision, it is fair to assume that there is sufficient reason for reversal, and such reversal should be cheerfully made.

Much discontent on the part of the solicitor arises from the fact of conflicting rulings between different companies. This is of course inevitable, to a certain extent, but we, as medical directors, should secure the experience of our own company, and exchange such statistics, which will enable us to rule more uniformly in the selection of risks. The medical department of the Northwestern is coding all of the classes, both medical and occupational, used by the Medico-Actuarial Committee, in which we are interested, and has added quite a large number of medical and occupational impairments, and many of the optional occupations and medical impairments of the Medico-Actuarial data are being utilized in our mortality investigation. It is the intention of the company to determine the mortality on this data about every five years. The data furnished by the Northwestern to the Medico-Actuarial Committee in 1908, has been utilized and the mortality determined by the Actuaries' department, most of which has been carried up to the policy

anniversary in 1920. This data has been very helpful to the medical department in risk selection. Would it not be advisable for all of the companies represented in this association to follow a like procedure and to exchange the results of our mortality experience?

A most important adjunct to medical selection is an intelligent, loyal, well-trained corps of local examiners. The medical department should keep in close touch with them, seize every available opportunity to correspond with them, pay their fees direct from the home office, and appoint only a sufficient number to insure efficient service—usually two in a community, a chief and an alternate, except in large cities. A physician, being human, will render much better service to the company and the agency force if he secures sufficient work to make it an object to give his very best efforts.

A medical director should adjust misunderstandings between the agents and examiners, strictly in accordance with the facts as ascertained after giving both parties an opportunity to be heard. The appointment of the examiner should be made, after an investigation by the home office, strictly on merit. A policy in the company should not be the sole determining factor, bearing in mind that it is of equal importance to guard the interests of the examiner as it is those of the solicitor. A loyal, efficient examiner is quite as essential as a loyal, efficient solicitor.

Human nature prompts the solicitor to appeal to the highest authority in his rejected cases, and if that authority be the medical director, it behooves us to fit ourselves to discharge our duties intelligently, fairly and justly and thereby increase the value of our service to the company we serve, and relieve the executive officers of a multitude of disagreeable and unnecessary duties in appealed cases. The medical department of the Northwestern is held responsible for a satisfactory mortality and is not interfered with in its duties. The company has a contented agency force, which cooperates with the medical department in a manner satisfactory to the management.

Dr. Grosvenor—Will Dr. Eakins close the discussion?

Dr. Eakins—Mr. President and Gentlemen of the Associa-

tion: I have admitted privately on several occasions and now will do so publicly that I am not overly proud of my thumb-nail sketch of Medical Directors for the reason of its limitations and shortcomings. That which it lacked has been supplied most ably by Drs. Willard, Symonds and Fisher, who have humbled me greatly with their compliments and have used the sketch as a starting point from which to read lessons of benefit to us all. Its only purpose was to prompt a little introspection and stock-taking and perhaps a trifle of personal revision. There is reason to believe that purpose has been accomplished.

Dr. Grosvenor—Dr. Porter will read the report of the Committee appointed to study Dreyer's work in relation to Life Insurance, of which Committee Dr. Symonds is Chairman.

Dr. Porter—The report of the Committee appointed to study Dreyer's work in relation to life insurance, outlines in detail the accomplishments thus far and leaves little for comment or discussion. The tremendous amount of work entailed has consumed so much time that it has been found impossible to give the mortality results at this meeting and the report is therefore essentially one of progress.

It is most gratifying to note in the study of Dr. Muhlberg's report the perfection in detail of each step in its accomplishment and both he and Mr. Koeppe are to be congratulated upon the great success of their undertaking.

The tremendous amount of work accomplished by Dr. Dublin and his working force at the Metropolitan Life Insurance Company during the past month deserves our keenest appreciation and we all, I am sure, look forward to learning of the particulars from him at this time.

The results of the work will be of inestimable interest and also of value, even should they be negative.

The suggestion of Dr. Rogers that the Joint Committee of Actuaries and Medical Directors be invited to participate in the investigation in an advisory capacity, is an excellent one and the ultimate results of such cooperation assures maximum success of the entire undertaking.

It is to be regretted that Dr. Symonds is unable to be present

to participate in the discussion of this subject and I am sure we will all await with keen interest the further reports to be submitted by Dr. Muhlberg and Dr. Dublin.

Before hearing from them I would move that a resolution be passed extending to Dr. Muhlberg, Mr. Hardcastle, Mr. Koeppe and the executive officers of the Union Central Life Insurance Company the appreciation and thanks of the members of this Association for their good will and courtesy and generous contribution to the work in connection with the study of Dreyer's work in relation to life insurance.

I would move further that a resolution of thanks be extended to the Metropolitan Life Insurance Company for its good will and courtesy in assuming the expense of the quarters for the tabulation of the data and for the services of Dr. Dublin's immediate assistants. To Dr. Dublin the members of the Association extend a vote of thanks for his valued services in directing his part of the work in connection with the study of Dreyer's work in relation to life insurance.

REPORT OF THE COMMITTEE APPOINTED TO STUDY DREYER'S WORK IN RELATION TO LIFE INSURANCE.

At a meeting of the Committee held on January 24th, 1923, it was estimated that the cost of the investigation would not exceed $15,000. The Chairman was authorized to apportion this amount among the Companies in the Association in accordance with the new business written by each company during the year 1921. The response was very gratifying. Out of 180 companies who were invited to participate, only the following refused:

American National Insurance Company, Galveston, Texas.
Continental Life Ins. Co., St. Louis, Mo.
Des Moines Life and Annuity Co., Des Monies, Ia.
(The) Farmers and Bankers Life Ins. Co., Wichita, Kans.
Inter-Southern Life Ins. Co., Louisville, Ky.
Atlas Life Ins. Co., Tulsa, Okla.
(The) Bank Savings Life Ins. Co., Topeka, Kans.

Iowa Life Ins. Co., Waterloo, Iowa.
Mutual Life of Ill., Springfield, Ill.
Provident Life Ins. Co., Bismarck, N. D.
Occidental Life Ins. Co., Albuquerque, N. M.
National American Life Ins. Co., Burlington, Iowa.
Standard, Montreal.
Gresham, Montreal.
No. British & Mercantile, Montreal.

The following is the list of the Companies that have contributed to the investigation.

List of the Companies Which Have Contributed Towards the Expense of the Dreyer Investigation Committee.

The following contributing companies are *regular* members of the Association of Life Insurance Medical Directors:

Aetna Life,	Hartford, Conn.
American Central Life of Indianapolis,	Indianapolis, Ind.
American Life,	Detroit, Mich.
Atlantic Life,	Richmond, Va.
Bankers Life,	Des Moines, Ia.
Bankers Reserve Life,	Omaha, Neb.
Berkshire Life,	Pittsfield, Mass.
Canada Life Assur. Co.,	Toronto, Ont.
Capitol Life,	Denver, Colo.
Central Life Assur. Soc.,	Des Moines, Ia.
Central Life of Illinois,	Ottawa, Ill.
Columbian National Life,	Boston, Mass.
Confederation Life Assn.,	Toronto, Ont.
Connecticut Mutual Life,	Hartford, Conn.
Connecticut General Life,	Hartford, Conn.
Equitable Life Assur. Soc.,	New York, N. Y.
Equitable Life of Iowa,	Des Moines, Ia.
Excelsior Life,	Toronto, Ont.
Federal Life,	Chicago, Ill.
Fidelity Mutual Life,	Philadelphia, Pa.
Franklin Life,	Springfield, Ill.
Great West Life Assur. Co.,	Winnipeg, Man.
Guardian Life,	New York, N. Y.
Home Life,	New York, N. Y.
Illinois Life,	Chicago, Ill.

Imperial Life Assur. Co.,	Toronto, Ont.
Jefferson Standard Ins. Co.,	Greensboro, N. C.
John Hancock Mutual Life,	Boston, Mass.
Life Ins. Co. of Va.,	Richmond, Va.
Lincoln National Life,	Fort Wayne, Ind.
London and Scottish Assur. Assn. Ltd.,	Montreal, Que.
London Life,	London, Out.
Manhattan Life,	New York, N. Y.
Manufacturers Life,	Toronto, Ont.
Maryland Life,	Baltimore, Md.
Massachusetts Mutual Life,	Springfield, Mass.
Metropolitan Life,	New York, N. Y.
Michigan Mutual Life,	Detroit, Mich.
Minnesota Mutual Life,	St. Paul, Minn.
Missouri State Life,	St. Louis, Mo.
Mutual Benefit Life,	Newark, N. J.
Mutual Life Assur. Co. of Canada,	Waterloo, Ont.
Mutual Life,	New York, N. Y.
Mutual Trust Life,	Chicago, Ill.
National Life of U. S. A.,	Chicago, Ill.
National Life,	Montpelier, Vt.
New England Mutual Life,	Boston, Mass.
New York Life,	New York, N. Y.
North American Life Assur. Co.,	Toronto, Ont.
North American Life,	Chicago, Ill.
Northwestern Mutual Life,	Milwaukee, Wis.
Northwestern National Life,	Minneapolis, Minn.
Occidental Life,	Los Angeles, Cal.
Pacific Mutual Life,	Los Angeles, Cal.
Pan American Life,	New Orleans, La.
Penn Mutual Life,	Philadelphia, Pa.
Peoria Life,	Peoria, Ill.
Philadelphia Life,	Philadelphia, Pa.
Phoenix Mutual Life,	Hartford, Conn.
Provident Mutual Life,	Philadelphia, Pa.
Prudential Ins. Co.,	Newark, N. J.
Reliance Life,	Pittsburgh, Pa.
Reserve Loan Life,	Indianapolis, Ind.
Royal Union Mutual Life,	Des Moines, Ia.
Security Mutual Life,	Binghamton, N. Y.
Southern Life and Trust Co.,	Greensboro, N. C.
Southwestern Life,	Dallas, Tex.
Southland Life,	Dallas, Tex.
State Life Ins. Co. of Indiana,	Indianapolis, Ind.

State Mutual Life Assur. Co.,	Worcester, Mass.
Sun Life Assur Co.,	Montreal, Que.
Travelers Ins. Co.,	Hartford, Conn.
Union Central Life,	Cincinnati, Ohio.
Union Mutual Life,	Portland, Maine.
United States Life,	New York, N. Y.
Volunteer State Life,	Chattanooga, Tenn.
West Coast Life,	San Francisco, Cal.

The following contributing companies are *associate* members of the Association of Life Insurance Medical Directors:

American Bankers Ins. Co.,	Chicago, Ill.
American National Assur. Co.,	St. Louis, Mo.
Amicable Life,	Waco, Tex.
California State Life,	Sacramento, Cal.
Central States Life,	St. Louis, Mo.
Cleveland Life,	Cleveland, Ohio.
Continental Life,	Wilmington, Del.
Columbus Mutual Life,	Columbus, Ohio.
Commonwealth Life,	Louisville, Ky.
Conservative Life,	Wheeling, W. Va.
Continental Assur. Co.,	Chicago, Ill.
Cedar Rapids Life,	Cedar Rapids, Ia.
Dakota Life,	Watertown, S. D.
Detroit Life,	Detroit, Mich.
Dominion Life Assur. Co.,	Waterloo, Ont.
Farmers National Life,	Chicago, Ill.
First National Life,	Pierre, S. D.
Farmers Life,	Denver, Colo.
Fort Worth Life Ins. Co.,	Fort Worth, Tex.
Great Southern Life,	Houston, Tex.
Guaranty Life,	Davenport, Ia.
George Washington Life,	Charleston, W. Va.
Girard Life,	Philadelphia, Pa.
Great Northrn Life,	Chicago, Ill.
Great Republic Life,	Los Angeles, Cal.
Home Life Ins. Co.,	Philadelphia, Pa.
Home Life and Accident Co.,	Fordyce, Ark.
Idaho State Life,	Boise, Idaho.
Indianapolis Life,	Indianapolis, Ind.
International Life,	St. Louis, Mo.
Inter-Mountain Life,	Salt Lake City, Utah.
Kansas City Life,	Kansas City, Mo.

Kansas Life,	Topeka, Kansas.
Lafayette Life,	Lafayette, Ind.
La Mar Life,	Jackson, Miss.
Life and Casualty,	Nashville, Tenn.
Louisiana State Life,	Shreveport, La.
Merchants Life,	Des Moines, Iowa.
Mid-Continent Life,	Oklahoma City, Okla.
Midland Life,	Kansas City, Mo.
Midland Mutual Life,	Columbus, Ohio.
Montana Life,	Helena, Mont.
Marquette Life,	Springfield, Ill.
Maryland Assur. Corp.,	Baltimore, Md.
Midland Ins. Co.,	St. Paul, Minn.
National Fidelity Life,	Sioux City, Iowa.
National Life and Accident,	Nashville, Tenn.
New World Life,	Spokane, Wash.
Northern Life,	Seattle, Wash.
National Guardian,	Madison, Wis.
North American Life,	Omaha, Neb.
Northern States Life,	Hammond, Ind.
Ohio State Life,	Columbus, Ohio.
Old Colony Life,	Chicago, Ill.
Old Line Life,	Milwaukee, Wis.
Oregon Life,	Portland, Oregon.
Omaha Life,	Omaha, Neb.
Peoples Life,	Frankfort, Ind.
Phoenix Assur. Co.,	Montreal, Que.
Postal Life,	New York, N. Y.
Protective Life,	Birmingham, Ala.
Provident Life and Accident,	Chattanooga, Tenn.
Peoples Life,	Chicago, Ill.
Prairie Life,	Omaha, Neb.
Public Savings Ins. Co. of America,	Indianapolis, Ind.
Register Life,	Davenport, Ia.
Rockford Life,	Rockford, Ill.
Royal Ins. Co. Ltd.,	Montreal, Que.
Scranton Life,	Scranton, Pa.
Security Life Ins. Co. of America,	Chicago, Ill.
Southeastern Life,	Greenville, S. C.
Southern State Life Ins. Co.,	Atlanta, Ga.
Standard Life,	St. Louis, Mo.
St. Louis Mutual Life,	St. Louis Mo.
Security Mutual Life,	Lincoln, Neb.
Shenandoah Life,	Roanoke, Va.

Southern Union Life,	Waco, Tex.
Standard Life,	Pittsburgh, Pa.
State Life of Montana,	Great Falls, Mont.
San Jacinto Life,	Beaumont, Tex.
Texas Life,	Waco, Tex.
Two-Republics Life,	El Paso, Tex.
United Life and Accident Ins. Co.,	Concord, N. H.
Western States Life,	San Francisco, Cal.
Western Union Life,	Spokane, Wash.
Wisconsin National Life,	Oshkosh, Wis.
Western Life,	Des Moines, Ia.
Wisconsin Life,	Madison, Wis.

Dr. Charles L. Christiernin, Treasurer of the Association, was appointed Treasurer of the Fund. On September 21st, 1923, he made a final statement that $15,041.92 had been collected and that every Company which had agreed to contribute had paid their quota.

Correspondence with the Union Central, initiated through Dr. Muhlberg, developed a most cordial co-operation. The Actuary, Mr. E. E. Hardcastle, put in charge of the work Assistant Actuary, Mr. A. J. Koeppe. He began the task promptly and now submits the following statement as a report of the conditions under which the data were compiled.

"In compliance with the request contained in your letter of August 18th, permit me to give you an outline of the methods used in gathering the data and preparing a duplicate set of Hollerith cards for the Dreyer Committee, which will form the basis for a study of the spine length in its relation to the assessment of physical fitness.

One card (in duplicate) was prepared for each application received by the Company during the years 1887 to 1908, both inclusive—a total of approximately 190,000 applications. The data given on the completed Hollerith cards are as follows:

Policy number
Age
Year of issue
Duration
Cause of termination
Cause of death

Occupation
Special class (women and colored)
Height
Weight
Build
Habitat
Chest measurement (average)
Abdominal measurement
Length of spine
Proportion of spine to height
The two most important impairments, if any.

All risks exposed were observed to the date of cancellation or to the anniversary in 1921, if prior.

Policies that were not accepted by the insured and returned, were disregarded entirely.

The various steps to complete the work were as follows:

All application papers pertaining to the policies in question were taken to the Statistical Department in their metal filing cases and the corresponding statistical cards were withdrawn from the statistical card file and the following items transferred from the medical papers to the statistical card:

(a) Chest measurement under forced inspiration.
(b) Chest measurement under forced expiration.
(c) Measurement of abdomen.
(d) Measurement of spine.

These cards were then handed to other clerks, who entered on them the percentage proportion of spine measurement to height and the average chest measurement, which was taken as the arithmetical mean between the chest measurements under forced inspiration and under forced expiration.

The applications pertaining to the earliest cases did not contain the abdominal measurement and of course this item could not be entered in those cases.

All applications pertaining to policies that were cancelled were then examined and the corresponding statistical cards were treated in the same manner as those belonging to policies still in force.

After all files had been examined there were left several

thousand statistical cards, for which no medical examination papers had been found, due to the fact that medical papers were either filed under a different policy number or were filed with the death loss papers.

As the statistical card contains the number with which the application is filed, we had no difficulty in finding the corresponding papers, though this part of the work took considerable time. In order to find the medical examination papers that were filed with the death loss papers, it was necessary to examine the claim papers filed under the claim number. This was a very slow procedure, partly due to the fact that some of the envelopes containing the death loss papers were very bulky.

All work was done in duplicate and both sets of our statistical cards (white and buff) were handled independently. As soon as the statistical cards were completed, Hollerith cards were perforated from them—also in duplicate—and the duplicate Hollerith cards were compared by the contact method, which was the first check applied. All cards that did not check were examined and the differences were traced to their source and corrected. The Hollerith cards were then tabulated to obtain an additional check by comparing totals.

Finally, it was necessary to examine all 1921 death losses and determine accurately whether death had occurred before or after the anniversary in 1921. If death had occurerd after 12 o'clock noon of the anniversary of the policy in 1921, the Hollerith card which had been perforated as "death in 1921" was destroyed and a new card prepared, as an "existing in 1921."

The cards were shipped to Dr. Dublin, Statistician of the Metropolitan, in special boxes and in no case were the corresponding duplicates placed in the same box or expressed on the same day. By this method we hoped to minimize the possibility of destruction of both sets of the cards.

I have not mentioned in this letter the method by which the various figures that were entered on the cards were obtained, and the various codes used, as this phase has been explained in detail to Dr. Symonds and Dr. Dublin.

I believe that the results of this study will be of great interest and value, even should they be negative. The most serious criticism that could be advanced against the value of this work is the fact that the Company never made use of the spine measurement and that in consequence many errors in measurements that were perhaps made by the examining physicians were not corrected.

An explanation is due the Committee of the causes that delayed the completion of the work, a number of weeks beyond the date originally estimated. It was necessary, in the first place, to use temporary clerks, and the quantity and quality of the work done by them was considerably below par. Particularly towards the end, when the work seemed to become less, we noticed a perceptible decrease in the amount of work turned out day by day. A very large number of errors also were made, that were found in checking by the contact method and that necessitated a great deal of extra work. Some of the clerks were compelled to work in the insurance vault during the hottest part of the summer and the temperature in this vault was such that their efficiency was greatly reduced. Another cause for the delay was the fact that during the time the work was done, the Statistical Department was moved from the thirteenth to the third floor and that it was necessary to delay the moving of the department on account of the extensive alterations which had to be done on the third floor. The space available for the Statistical Department on the thirteenth floor was insufficient and it was not possible to employ the necessary number of temporary clerks until after the removal was accomplished.

Finally, great difficulties were encountered in handling the death claims. In many cases it took much time to find the papers required, but on account of the importance of obtaining all the death losses and marking them correctly, great care was taken in handling this part of the work."

Owing to these delays the last of the cards were not received by Dr. Dublin until the first week in September.

Dr. Rogers suggested that the Joint Committee of Actuaries

and Medical Directors be invited to participate in this investigation in an advisory capacity. This invitation was accepted by them and the Joint Committee was represented by the Chairman, Mr. Arthur Hunter, at a meeting held on May 16th. At this Committee meeting it was decided that only white men should be included in the tabulation, as the other races were too few and the women also, especially when divided according to their marital status. It was decided to exclude cases which showed certain impairments and certain hazardous occupations. At this meeting, Mr. Hunter said that the New York Life was too much occupied to permit them to take over any of the tabulating and Dr. Symonds made the same statement with regard to the Mutual Life. Dr. Dublin said that he would be able to attend to it in the Metropolitan Life and his offer was thankfully accepted. For calculating the expected deaths the Committee decided to use either the American Men's Table or the Medico-Actuarial Table, whichever one seemed the better fit for the material.

In his discussion of this report, Dr. Muhlberg will present the conditions which guided the selection of risks in the Union Central during the period in which the measurements of the spine-length were taken by the examiners.

With great regret we have to report that we cannot give any of the mortality results at this meeting. The last of the Hollerith cards were only received by Dr. Dublin in the first week of September. He has been working his force night and day since then but all that he can accomplish will be some of the averages and correlations of the measurements. These will give an idea of the nature of the material and he hopes very much to have it printed in time for the meeting.

The Committee recommends that a suitable resolution be adopted thanking the Union Central for its good will and courtesy since it has assumed all the expense of the quarters for the compilation of the data, the services of Mr. Koeppe and doubtless those of others, and has refused to accept more than its original estimate, though that has been considerably exceeded.

The Committee recommends that a resolution of thanks be extended to the Metropolitan Life for its good will and courtesy since it has assumed the expense of the quarters for the tabulation of the data and for the services of Dr. Dublin's immediate assistants; and to Dr. Dublin himself the Association will owe a substantial debt of thanks.

The Committee recommends that it be extended with power to report at or before the next annual meeting of the Association.

Respectfully submitted,

OSCAR H. ROGERS
T. H. ROCKWELL
WILLIAM MUHLBERG
J. ALLEN PATTON
LOUIS I. DUBLIN
BRANDRETH SYMONDS
Chairman.

Dr. Grosvenor—We will take up the resolutions of thanks suggested by the Committee. Dr. Porter has moved that a resolution be passed extending to Dr. Muhlberg, Mr. Hardcastle, Mr. Koeppe, and the Executive Officers of the Union Central Life Insurance Company the appreciation and thanks of the members of this Association for their good will and courtesy and generous contribution to the work in connection with the study of Dreyer's work in relation to Life Insurance. Does anyone second that motion?

Motion was seconded by Dr. Hobbs and carried.

Dr. Grosvenor—Dr. Porter has moved also that a resolution of thanks be extended to the Metropolitan Life Insurance Company for its good will and courtesy in assuming the expense of the quarters for the tabulation of the data and for the services of Dr. Dublin's immediate assistants. To Dr. Dublin the members of the Association extend a vote of thanks for his valued services in directing his part of the work in connection with the study of Dreyer's work in relation to life insurance. Is that motion seconded?

Dr. Weisse seconded the motion and it was carried.

DISCUSSION

Dr. Grosvenor—Dr. Muhlberg will open the discussion of this report.

Dr. Muhlberg—Mr. President: I have really very little to say. Dr. Symonds suggested that perhaps a little historical account might be of some value, indicating just why the Union Central Life Insurance Company engaged in making stem measurements, and also under what conditions those stem measurements were secured. So far as your resolution is concerned, I am sure that we appreciate it very much, but you must remember that we smaller companies owe a heavy debt of gratitude to this Association, and particularly to the larger companies, in the enormous contributions that they have made and which have been of great value to us, and we feel it not only our duty but also a great pleasure to reciprocate by a partial payment of this sort.

The idea of measuring the spine in connection with insurance examinations for the Union Central originated with Dr. Wm. B. Davis. I find that the first measurement was made February 11th, 1887, and the last on December 30th, 1908.

I regret that I am unable to state exactly what purpose Dr. Davis had in mind when he introduced into our examination blank the question: "What is the length from the seventh cervical vertebra to the extremity of the os coccygis?" However, it is very probable, since Dr. Wm. B. Davis performed a great many insurance examinations for our Company, that he noted, as all of us have at times, that there is a marked disproportion in many persons between the length of the limbs and neck and that of the torso. On apriori grounds, it would be quite reasonable to postulate the theory that the length of the body should be of greater significance than the individual's height.

After all, we fear overweight because we have reason to believe that the excess throws extra work on the heart, kidneys and other thoracic and abdominal viscera; and it is rather

logical to infer that a large torso will contain larger organs, which of course, are better fitted for the additional work.

Since the circumferential measurements, i. e., average chest expansion and girth, are given on our statistical cards, it might be possible to base some interesting studies on the relation of the bulk of the torso to life expectancy—the bulk of the torso being represented by some equation expressing the three factors of spine length, chest and abdomen circumferences.

There is no doubt that the internal secretions have a governing influence on build, as noted particularly in the stunted growth of the hypothyroid and the gigantism of the hyperpituitary cases. While myxedema and acromegaly are of course pathological conditions, there are nevertheless, slight physiological variations in every individual—and such slight divergence often determines individual peculiarities in build. A tall man with a short spine length very probably is of the hyperpituitary type. It might be well to keep in mind some of these governing factors in developing and analyzing our statistics.

I made quite a few stem measurements during the years 1907-8, and I believe it is as easy to measure the spine as it is the height—easier where one depends solely on a tape-measure —and I believe that the figures given by our examiners are as accurate as the other figures of build, chest and girth. Occasionally, rather ridiculous mistakes were made by our examiners. A few of them, no doubt confused by the polysyllabic anatomical wording, insisted on measuring the external urethra instead of the spine.

Apparently neither Dr. Wm. B. Davis nor his successors, ever used the spine measurement in selecting applicants, although occasionally they used the figures to strengthen their argument with the agent, where a controversy arose in connection with an overweight rejection.

Dr. Clark W. Davis discontinued asking for the stem measurement in 1909, partly because it seemed of no immediate practical use, but mostly because he wished to condense the medical examination form, which at that time was too long.

Furthermore, we had evidently accumulated enough material on which to base statistical studies. I remember Dr. Davis's stating that he hoped such studies would some day be undertaken.

It may be of interest to give a resume of our principal rules during the time that we were requesting spine measurements. I have reviewed this with Mr. Koeppe and so far as I am able to get at the facts, our rulings prior to 1908 were as follows:

(1) We required no blood pressure.
(2) Our inspection service was rather poor and many cases were not at all inspected. Alcoholics were declined or considered on individual merits.
(3) A chemical urinalysis was not required for the younger ages (40 and under) and, I think, for amounts of $2,000 or less.
(4) We were more liberal in treating overweights, issuing as a rule without much limitation up to 35% and even 40% overweight, although very often, in cases over 30% overweight, we offered limited endowments.
(5) Our underweight limit throughout was 20% below the average.
(6) Tubercular family history at the younger ages was treated by offering endowment plans of insurance.
(7) We accepted syphilitics, provided there was freedom from symptoms for five years, by offering them 10, 15 or 20 year endowments.
(8) Great stress was laid on the family history and any lack of longevity was treated by offering endowments to mature at about the age of 60.
(9) Occupations were handled either by offering extra premiums or endowment plans. We did not accept any miners, horse jockeys, linemen, retail liquor dealers, sawyers, marble cutters, metal workers exposed to occupational hazards, active military service men, those engaged in navigation (outside of the officers), policemen or more hazardous railway occu-

pations and zinc workers. Some of the occupations, such as painters, fishermen and ice dealers, were offered endowment plans.

(10) We always refused to issue to applicants with heart murmurs, irregular pulse, pulse rate above 85 or 90, and declined all suspicious lung cases.

(11) So far as I know, we paid very little attention to the spine measurements; we were merely interested in collecting the statistics with a view some day of making an investigation.

(12) We generally declined to issue to persons having had tuberculosis, but I believe exceptions were made, where they lived in Colorado and at least ten years had elapsed since full recovery.

Dr. Grosvenor—We will now hear from Dr. Dublin who has a report to make for the Committee:

Huthropometrical Supplement to Report of Committee on Dreyer's Work.

By Dr. Louis I. Dublin.

The Committee undertook three tasks during the past year. We first endeavored to check up Dreyer's formulas and tables* by applying his criteria of physical fitness to the records of 1,000 male employees of the Metropolitan Life Insurance Company Home Office; then we tested certain measures of spine-length in the records of three of the companies to see if spine-length was substantially as good a measure as the "stem-length," or sitting height, measure used by Dreyer. Then we entered upon certain steps in preparation for a mortality investigation test of the experience records of the Union Central Life Insurance Company. Each of the tasks will be briefly discussed in the following text.

I. Dreyer's Criteria of Physical Fitness Applied to 1,000 Male Employees of Metropolitan Life Insurance Company Home Office.

Each of the employees was given a physical examination, and this included among other things the measurement of height-sitting (stem-length), chest girth, body weight and vital capacity. In the lack of any satisfactory definition of "physical fitness" by Dreyer, we had to assume that this meant the absence of serious physical impairments which could be discovered by usual clinical examination methods. The Dreyer criteria of (*a*) vital capacity and (*b*) body weight were then applied to the data and the main conclusions of the study are set forth below:

1. The Vital Capacity Criterion of Dreyer.

The cases were first grouped as to whether they showed serious physical impairments or not, according to the medical

*Dreyer, Georges, "The Assessment of Physical Fitness," Paul B. Hoeber, New York, 1921 pp. 127. *See also:* Dublin, Louis I., "Work of Dreyer in Relation to Life Insurance Examinations." *Proceedings*, Association of Life Insurance Medical Directors 1922, p. 202, and Fisk, Eugene L., Discussion of Dr. Dublin's paper, *Proceedings*, 1922, p. 216.

examination. The vital capacity criteria are supposed to result in a judgment "probably normal" or "probably abnormal" according as the value for the individual is 90 per cent. or more, or under 90 per cent., respectively of the tabular value. We used Dreyer's two vital capacity formulas; the first, based upon chest measurement and stem-length; the second, upon body-weight. The two readings in each case were averaged and the case placed in the "probably normal" or "probably abnormal" groups as indicated by the value of the vital capacity coefficient.

In the following table we show what happened when impaired and unimpaired lives were so scaled and classified:

TABLE 1.

Percentage of Cases among 1,000 Male Employees of Metropolitan Life Insurance Company, Home Office, 1922, Showing Probably Abnormal (less than 90%) and Probably Normal (90% or more) Vital Capacity, with and without Physical Impairments—by Age.

Percentage, Actual of "Predicted" Vital Capacity	All Ages		Under 25 years		25 to 44		45 and over	
	Without impairment	With impairment	Without impairment	With impairment	Without impairment	With impairment	Without impairment	With impairment
Less than 90%...	31.2	38.6	13.1	0	31.2	35.4	54.8	52.4
90% plus.....	68.8	61.4	86.9	100.0	68.8	64.6	45.2	47.6
TOTAL.....	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number of cases in group.....	754	246	92	7	567	178	95	61

In the above table there are a number of serious inconsistencies. If the vital capacity criteria are in any way useful, why should there be as many as 31.2 per cent. of the "no impairment" cases thrown by Dreyer's criterion into the "probably abnormal" (less than 90 per cent.) group? Or why, in the age groups under 25, and 45 and over, should there be a larger proportion of "probably abnormal" vital capacity cases in the unimpaired than in the impaired group? Under age 25, all of the 7 cases showing serious impairment were

classed by Dreyer's criterion in the "probably normal" vital capacity group! These, and other facts in the table, suggest that low vital capacity does not seem to be consistently associated with serious physical impairment by actual clinical observation.

In detecting "unfit" persons with disease of the pulmonary tract, the vital capacity criterion breaks down decisively. In 23 cases having clinically significant pulmonary signs, only 56 per cent. were "predicted abnormal" by Dreyer's tables! In 53 cases where there were pulmonary signs of no particular clinical significance, the Dreyer tables of the vital capacity criterion missed three-quarters of the cases. This same test was applied to other serious impairments (abnormal blood pressure, glycosuria, albumin in the urine with casts, albumin without casts, organic heart disease and functional heart disease) and in each case the results were disappointing. The use of the Dreyer vital capacity tables does not permit us, therefore, to predict a large proportion of cases having a definite, serious impairment. It, furthermore, marks as "probably abnormal" a large number of cases, which, according to careful physical examination, are in good health.

2. The Weight Criterion of Dreyer.

Dreyer's criterion of weight in relation to sitting height and chest girth also gave negative results. Dreyer recognizes four possible degrees of departure in weight in relation to "physical fitness." Persons 15 per cent. or more over or under the predicted weight, he considers "certainly abnormal." Those 10 or 15 per cent. above or below the normal weight, he considers "probably abnormal," and those 5 to 10 per cent. above or below the predicted weight, he designates as "possibly abnormal." In the following table we give a digest of our application of his weight criterion to these 1,000 records of males.

TABLE 2.

Percentage of Cases Among Impaired and Unimpaired Lives Falling in Four Classes According to Dreyer's Table of the Weight Criterion.

Judgment based upon Dreyer's Weight Criterion	WITHOUT IMPAIRMENT		WITH IMPAIRMENT	
	No. of Cases	Per cent.	No. of Cases	Per cent.
Certainly abnormal	86	11.2	23	9.3
Probably abnormal	114	15.1	52	21.1
Possibly abnormal	227	30.1	64	26.0
Normal	327	43.4	107	43.5
TOTAL	754	100.0	246	100.0

Strangely enough, the weight criterion stamps as "normal" the same percentage (43) of cases in both impaired and unimpaired groups. Again we see that no dependence can be placed upon Dreyer's tables in predicting the "unfit" or impaired lives in a general experience. The margin of error is too great!

3. COMBINED VITAL CAPACITY AND WEIGHT CRITERIA OF DREYER.

We prepared a table showing the persons predicted normal by *both* of Dreyer's criteria. This table need not be given at the present time. We shall only quote the general results. Out of 754 males having no serious physical impairment, the combined criteria judged only 59 per cent. of these cases to be "normal." Among 246 cases having serious impairments, 51 per cent. were "predicted" to be normal! In other words, the use of Dreyer's *combined* criteria for vital capacity and weight would result in missing one-half of the seriously impaired cases!

4. SUMMARY OF SECTION I.

It seems hardly necessary to say that until a better definition of "physical fitness" is found than the one customarily used, and until further responsible anthropometric research is pursued, we cannot use in practical underwriting work any such arrangement of formulas and tables as are found in Dreyer's book. There is a deep appeal in enterprises of this kind; the

method itself is convenient, and to the uncritical mind its use seems to be desirable. But the actual results of a check between the formulas and careful physical examination show that at the present time the subject is still open for further development, especially in the direction of a mortality test such as will be described later on.

II. Test of Spine-length and Stem-length Measures by Exchange of Intercompany Data.

The collapse of the Dreyer formulas and tables suggested a more searching test of body measurement data as an indication of physical fitness. The Committee proposed a mortality investigation on the ground that low mortality and high longevity was in the last analysis the ultimate test of fitness to survive under conditions of modern civilization. None of the companies had stem-length data such as Dreyer used, but one Company* had a record of spine-length (distance from *vertebra prominens* to tip of *coccyx*). If these latter measurements were found to be substantially as good as the stem-length or sitting-height measurements, the investigation could be made.

Accordingly, the New York Life Insurance Company, the Mutual Life Insurance Company and the Metropolitan Life Insurance Company contributed data, and the results of certain test calculations are shown below.

*Union Central Life Insurance Company.

TABLE 3.

Statistical Constants of Stem-length (sitting height) and Spine-length Computed from Measurements Submitted By New York Life Insurance Company (497 cases), Mutual Life Insurance Company (472 cases) and Metropolitan Life Insurance Company (285 males and 1,031 females). (All measurements in inches.)

Statistical Constant	N. Y. Life	Mutual Life	Metropolitan Life	
			Males	Females
Stem-length (sitting height):				
Mean	34.25 ± .05	34.32 ± .05	34.67 ± .06	32.72 ± .03
Median	34.60 ± .06	34.47 ± .06	34.85 ± .07	33.20 ± .03
Standard deviation	1.49 ± .03	1.46 ± .03	1.41 ± .04	1.21 ± .02
Spine-length (*vertebra prominens* to tip of *coccyx*):				
Mean	24.10 ± .04	25.68 ± .06	25.09 ± .05	23.64 ± .02
Median	24.37 ± .05	26.03 ± .07	25.31 ± .06	24.01 ± .03
Standard deviation	1.31 ± .03	1.84 ± .04	1.30 ± .04	1.15 ± .02
Coefficient of variability	*	7.13 ± .16	*	*
Correlation (covariation) between sitting height and spine-length:				
Coefficient, with probable error	.67 ± .02	.59 ± .02	.67 ± .02	.69 ± .01
Regression coefficient:				
Sitting height & spine-length	.76	.74	.61	.66
Spine-length & sitting height	.59	.47	.72	.72

*Not computed at this writing.

In view of the high values of the coefficient of correlation, or covariation, and of the regression coefficient, it was decided by the Committee that the measurement of the spine-length would be suited for use in the mortality investigation outlined in the ensuing section.

III. Preliminary Steps in the Mortality Investigation.

The Committee met early in 1923 and outlined plans for tabulating the records submitted by the Union Central Life Insurance Company. Two general lines of procedure were established. Descriptions of the anthropometric data were to be made first, in order to suggest avenues of approach for the mortality investigation. The second step was to compile a general, or norm, mortality table for all standard lives in the experience 1887 to 1907 and then to prepare special experience

tables according to build classes in relation to relative or absolute spine-length, as indicated by the facts of the anthropometric descriptive tables.

About 192,350 tabulating cards, in duplicate sets, were furnished by the Union Central Life Insurance Company, and work was begun during the first week in September, 1923. We shall comment upon the results available at the present writing.

There are available (1) a description of "percentage, spine-length of total height" (relative spine-length) in relation to age; (2) height in relation to absolute spine-length; (3) absolute spine-length in relation to height; and (4) relative spine-length among overweights (short men, men of average or medium height, and tall men).

1. Relative Spine-length in Relation to Age.

The mean relative spine-length for all the cases was 36.8 (percentage, spine-length of total height). This figure increased slightly with advancing age. The standard deviation, or measure of average scatter or dispersion, was 2.9, or 7.9 per cent. of the mean value. This latter figure is known as the coefficient of variability. The series were only slightly "skew" or asymmetrical, and the small value of the so-called "excess," which shows how much the mode of the given series exceeds that of a normal, symmetrical distribution, suggested that the material we were dealing with very closely approached a so-called normal distribution.

TABLE 4.

Derived Values. Union Central Policy Issues. Characteristics of "Per cent. Spine-length of Total Height" for Given Age Groups.

AGE PERIOD	CHARACTERISTICS OF "RELATIVE SPINE-LENGTH"		
	MEAN	STANDARD DEVIATION (σ)	COEFFICIENT OF VARIABILITY (v)
ALL AGES.....	36.806 ± .004	2.913 ± .003	7.913 ± .009
Under 20.....	36.163 ± .024	2.992 ± .017	8.274 ± .048
20 to 24.....	36.549 ± .011	2.865 ± .007	7.840 ± .022
25 to 29.....	36.719 ± .009	2.895 ± .067	7.885 ± .018
30 to 34.....	36.840 ± .010	2.920 ± .007	7.940 ± .019
35 to 39.....	36.963 ± .011	2.885 ± .008	7.804 ± .022
40 to 44.....	37.045 ± .014	2.883 ± .010	7.783 ± .027
45 to 49.....	37.019 ± .018	2.958 ± .013	7.990 ± .035
50 to 54.....	37.113 ± .026	2.998 ± .001	8.077 ± .049
55 to 59.....	37.217 ± .035	2.865 ± .025	7.697 ± .067
60 to 64.....	37.090 ± .063	3.060 ± .044	8.190 ± .120

We found that 166,000 or 86 per cent. of our 192,356 cases fell into a zone included by the value of the standard deviation on both sides of the mean value. Very small and very large values for relative spine-length were rare. Only 790 cases, or .4 per cent. of the total showed relative spine-lengths of less than 25, and 803, or .4 per cent. had a value above 45. It will be one purpose of the investigation according to build classes to detect those cases of apparent overweight whose spine-lengths presumably show their ability to carry the weight with a favorable longevity prospect.

2. HEIGHT IN RELATION TO ABSOLUTE SPINE-LENGTH.

The facts in the foregoing section showed that we could ignore for the time being the age factor in making these preliminary descriptions of our anthropometric material. We then tabulated for unit inch of height the absolute spine-lengths. From this tabulation we computed for each height class, the mean absolute spine-length, the standard deviation and coefficient of variability. We also computed the appropriate coefficients of correlation or covariation and the regression coefficients.

TABLE 5.

Derived Values. Union Central Policy Issues. Characteristics of Absolute Spine-length for Given Height.

TOTAL HEIGHT IN INCHES	CHARACTERISTICS OF ABSOLUTE SPINE-LENGTH IN INCHES		
	MEAN	STANDARD DEVIATION (σ)	COEFFICIENT OF VARIABILITY (v)
All heights	25.10 ± .003	2.10 ± .002	8.36 ± .009
60	23.25 ± .102	2.34 ± .072	10.08 ± .313
61	22.53 ± .106	2.49 ± .075	11.07 ± .337
62	22.92 ± .046	2.02 ± .033	8.80 ± .144
63	23.27 ± .031	1.91 ± .022	8.21 ± .095
64	23.60 ± .018	1.92 ± .013	8.11 ± .056
65	23.93 ± .013	1.88 ± .009	7.85 ± .039
66	24.26 ± .010	1.95 ± .007	8.06 ± .029
67	24.59 ± .008	1.88 ± .006	7.66 ± .024
68	24.86 ± .007	1.92 ± .005	7.72 ± .021
69	25.18 ± .008	1.95 ± .005	7.74 ± .022
70	25.46 ± .008	1.96 ± .005	7.70 ± .022
71	25.84 ± .009	1.97 ± .006	7.63 ± .025
72	26.21 ± .011	2.00 ± .008	7.62 ± .031
73	26.69 ± .020	2.03 ± .014	7.59 ± .005
74	26.98 ± .003	2.14 ± .021	7.95 ± .079
75	27.50 ± .057	2.17 ± .004	7.90 ± .015
76	27.76 ± .139	2.14 ± .098	7.72 ± .240

The mean absolute spine-length was about 25 inches and showed a slight rising tendency with an increase in total height. In the present series we observed an increase of .333 (about one-third of an inch) in absolute spine-length for an increase of one inch in total height.

The standard deviation, or average deviation from the mean absolute spine-length, was about two and one-tenth inches, or 8.4 per cent., and no particular change in this figure was observed from one height class to the other. If we allow a deviation of about two inches on each side of the mean absolute spine-length, we find that the zone so established includes 157,495 or 82 per cent. of the cases in our table. Only 2,712 cases or 1.4 per cent. showed absolute spine-lengths of less than twenty inches; 3,038 cases, or 1.6 per cent. had spine-lengths of thirty inches or more. It will be seen that about the same proportion of our total cases fall within the value of the standard deviation (82 per cent.) as was observed for relative spine-

length (86 per cent.) In other words, a range of about 8 per cent. on both sides of the mean includes four-fifths to nine-tenths of the cases.

3. Absolute Spine-length in Relation to Height.

We reversed the relationships shown in the preceding section and now have for consideration the height characteristics of the cases classified according to absolute spine-length groupings. We excluded from our present calculations all spine-lengths less than eighteen or more than 31 inches because the numbers of cases were too small to give reliable results in the calculation of characteristics of the series.

The mean height for the whole group was not far from 69 inches, and height seemed to increase slightly with increase in absolute spine-length. There was an increase of about one-sixth of an inch in total height for each increase of one inch in absolute spine-length. This shows that other factors, leg-length for instance, are the really influential elements in determining total height.

TABLE 6.

Derived Values. Union Central Policy Issues. Characteristics of Height for Given Absolute Spine-length

SPINE-LENGTH IN INCHES	CHARACTERISTICS OF HEIGHT IN INCHES		
	MEAN	STANDARD DEVIATION(σ)	COEFFICIENT OF VARIABILITY (v)
All spine lengths	68.67 ± .004	2.39 ± .003	3.48 ± .004
18	68.03 ± .068	2.75 ± .048	4.04 ± .071
19	67.58 ± .057	2.82 ± .040	4.17 ± .060
20	67.37 ± .043	2.75 ± .030	4.08 ± .045
21	67.14 ± .030	2.68 ± .021	3.99 ± .032
22	67.11 ± .018	2.47 ± .013	3.68 ± .019
23	67.42 ± .012	2.28 ± .008	3.38 ± .012
24	67.90 ± .008	2.17 ± .006	3.19 ± .008
25	68.47 ± .007	2.10 ± .005	3.07 ± .007
26	69.18 ± .007	2.09 ± .005	3.01 ± .007
27	69.79 ± .009	2.09 ± .006	3.00 ± .009
28	70.32 ± .014	2.15 ± .010	3.05 ± .014
29	70.68 ± .023	2.25 ± .016	3.18 ± .023
30	70.99 ± .038	2.25 ± .022	3.18 ± .038
31	70.88 ± .071	2.58 ± .050	3.64 ± .071

The standard deviation for height was 2.39 inches, or some three and one-half per cent. of the mean height.

If we allow a little more than two inches, or three and one-half per cent., departure from both sides of the mean height, we find that that includes 131,560 of our height measures, or 68 per cent.

IV. Relative Spine-length Among Overweights.

A primary description was made of the build classes in the whole 192,000 units. We found that about one-third (33.4 per cent.) were judged to be "normal" as to weight in relation to height according to the build classification based upon the Shepherd Table. Slight overweight (about 15 or 16 pounds above normal) was observed in 14 per cent. of the cases, and weights in excess by as much as 32 pounds were found in 5 per cent. Slight underweight (about 15 pounds) was found in 37 per cent. of the total and some 32 or 33 pounds in deficit from the "normal" for height was tabulated in 9 per cent. All "overweights" constituted 19.8 per cent. and all "underweights" 46.8 per cent. of the total. Slightly more "overweight" was found among men of medium height (20.1 per cent.), and in tall men (20.0 per cent.), than among short men.

TABLE 7.

Number and Percentage of Men in Specified Build Classes, Distinguishing Men of Short, Average or Medium and Tall Height Groups.

Union Central Policy Issues, 1887 to 1907.

BUILD CLASS	ALL MEN		SHORT MEN		MEN OF MEDIUM HEIGHT		TALL MEN	
	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.
ALL CASES	192,350	100.0	34,873	100.0	114,042	100.0	43,435	100.0
Build Class:								
0—Normal	64,260	33.4	12,782	36.7	37,582	33.0	13,896	32.0
Overweights (total)	38,062	19.8	6,567	18.8	22,888	20.1	8,607	20.0
1	25,932	13.5	4,390	12.6	15,866	13.9	5,676	13.1
2	9,494	4.9	1,670	4.8	5,560	4.9	2,264	5.2
3	2,323	1.2	450	1.3	1,279	1.1	594	1.4
4	304	.2	55	.2	180	.2	69	.2
5	9	..	2	..	3	..	4	..
Underweights (total)	89,993	46.8	15,504	44.5	53,571	47.0	20,918	48.2
6	71,947	37.4	13,051	37.4	43,220	37.9	15,676	36.1
7	17,751	9.2	2,330	6.7	10,268	9.0	5,153	11.9
8	284	.1	112	.3	83	.1	89	.2
9	11	..	11	..	....	..	....	..
No build specified	35	..	20	.1	1	..	14	..

NOTE.—The height groups were as follows: Short men: 66 inches and less; men of average or medium height: 67 to 70 inches; tall men: 71 inches and over. (Page 7, Vol. II, Medico-Actuarial Investigation.)

Build classes: Judgment of overweight based upon modified Shepherd Table at age group 35 to 39 years. Build 0=normal weight. Builds 1 to 5 in increasing order of weight in excess of assumed Shepherd norm. At 68 inches in height, the excess in pounds of weight above normal are: Class 1: 16; Class 2: 32; Class 3: 48; Class 4: 62; Class 5: 78 or more.

Builds 6 to 9 show increasing degree of underweight with increment of 15 or 16 pounds for each class. (Pages 120 and 121, Vol. I, Medico-Actuarial Investigation.)

The short men (66 inches and under) made up 18 per cent. of this population; men of average or medium height 59 per cent., and tall men (71 inches or more) were found in 23 per cent. of the cases. This distribution of the three height groups varied but slightly at the several build classes.

TABLE 8.

Number and Percentage of Men in Specified Height Groups Within Each Build Class.
Union Central Policy Issues, 1887 to 1907.

BUILD CLASS	ALL MEN		SHORT MEN		MEN OF MEDIUM HEIGHT		TALL MEN	
	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.
ALL CASES	192,350	100.0	34,873	18.1	114,042	59.3	43,435	22.6
Build Class:								
0—Normal	64,260	100.0	12,782	19.9	37,582	58.5	13,896	21.6
Overweights (total)	38,062	100.0	6,567	17.3	22,888	60.1	8,607	22.6
1	25,932	100.0	4,390	16.9	15,866	61.2	5,676	21.9
2	9,494	100.0	1,670	17.6	5,560	58.6	2,264	23.8
3	2,323	100.0	450	19.4	1,279	55.1	594	25.6
4	304	100.0	55	18.1	180	59.2	69	22.7
5	9	100.0	2	22.2	3	33.3	4	44.4
Underweights (total)	89,993	100.0	15,504	17.2	53,571	59.5	20,918	23.2
6	71,947	100.0	13,051	18.1	43,220	60.1	15,676	21.8
7	17,751	100.0	2,330	13.1	10,268	57.8	5,153	29.0
8	284	100.0	112	39.4	83	29.2	89	31.3
9	11	100.0	11	100.0	....	..	....	..
No build specified	35	..	20	..	1	..	14	..

See note at foot of Table 7 for explanation of height and build classes.

The relative spine-lengths were then tabulated for the overweight groups, and the following "characteristics" were calculated: (1) Mean relative spine-length, (2) Standard deviation of relative spine-length, (3) the number and proportion of cases falling outside the zone of the standard deviation on both sides of the mean. (See tables 12 and 13.)

1. RELATIVE SPINE-LENGTH AMONG OVERWEIGHT SHORT MEN.

There were 6,567 of these units in the experience. Only 507 of these short men fell into the build classes indicative of excessive weight (48 pounds or more above "normal.") More than four thousand (4,390) out of the 6,567 were in build Class 1, indicating about 15 pounds above average weight for height.

TABLE 9.

Frequency Per 1,000 of Specified Relative Spine-lengths* Among Short Men Overweights, by Build Classes. Union Central Policy Issues, 1887 to 1907.

Relative Spine-length*	Build Class					
	All Build Classes	1	2	3	4	5
TOTAL CASES	1,000	1,000	1,000	1,000	1,000	1,000
Relative Spine-length:						
18.2—20.6	....	....	....	....	....	....
20.7—23.1	†	†	....	2	....	....
23.2—25.6	2	2	2	4	....	....
25.7—28.1	6	6	6	2	18	....
28.2—30.6	14	15	12	9	....	....
30.7—33.1	31	34	26	20	36	....
33.2—35.6	160	168	140	158	145	....
35.7—38.1	354	365	338	320	309	....
38.2—40.6	302	296	320	289	291	1,000
40.7—43.1	106	93	120	164	164	....
43.2—45.6	20	16	28	27	36	....
45.7—48.1	3	3	4	2	....	....
48.2—50.6	1	1	1	2	....	....
50.7—53.1	1	1	2	....	....	....
53.2—55.1	†	†	1	....	....	....
TOTAL CASES IN ARRAY	6,567	4,390	1,670	450	55	2

*Percentage, spine-length of total height.

†Less than .5.

See note at foot of Table 7 for explanation of height and build classes.

High values for relative spine-length (exceeding the swing of the standard deviation above the mean) were observed among short men in 839 cases, or 12.8 per cent., and low values (below the mean by more than the standard deviation) in 963 instances, or 14.7 per cent. In 73 per cent. of our short men the variation in relative spine-length comes within the range of dispersion of a normal series. These ratios do not change materially with build group. By careful reclassification or other refinement of this material, it will be possible to construct our special mortality tables so as to show what the longevity prospects are for short men in the several build classes with respect to favorable relative spine-lengths. The Committee is confident that the mortality experience of overweights varies with regard to the several degrees of departure

from the mean relative spine-length, and in our materials there seem to be sufficient data for reaching sound judgments on these points.

In Table 12, we show the mean relative spine-lengths at the several build classes, together with the standard deviation, or measure of average dispersion for short men overweights. It will be seen that short men overweights have slightly higher values for mean relative spine-length than do men of average or medium height. In general, the mean relative spine-length among overweights seems to decrease with increase in height. There is also greater normal variability in mean relative spine-length among short men than among men of average or medium height, or among tall men. (See Table 12.)

As compared with the mean relative spine-length among all men in the experience (36.8), short overweights have the higher value (37.7).

2. Relative Spine-length Among Overweights of Medium or Average Height.

Here we have a much more generous observation group (22,888 cases). Some 15,900 are in the 15 pounds overweight class, and about 5,600 in the 32 pounds overweight group. Persons showing 48 pounds or more overweight for their height were observed in 1,462 instances. Twelve per cent. (2,789 cases) of this material showed relative spine-lengths above the limit of normal range, *i. e.*, beyond the limit set by the standard deviation, and 14.3 per cent. (3,282 cases) were in the exceptionally low relative spine-length group (exceeding the lower limit of the standard deviation). Seventy-four per cent. of the cases fell within the range of the standard deviation about the mean. (See Table 13.)

Overweights of average or medium height show in general a lower mean relative spine-length, and less dispersion in this measure than did short men (see Table 12). The mean relative spine-length among all overweights of average or medium height (37.4) may be compared with the figure of 36.8 for all lives in this experience combined.

TABLE 10.

Frequency Per 1,000 of Specified Relative Spine-lengths* Among Overweight Men of Average or Medium Height, by Build Classes.

Union Central Policy Issues, 1887 to 1907.

Relative Spine-length*	BUILD CLASS					
	All Build Classes	1	2	3	4	5
TOTAL CASES	1,000	1,000	1,000	1,000	1,000	1,000
Relative Spine-length:						
18.2—20.6	....	....	....	....	....	....
20.7—23.1	†	1	1	....	....	....
23.2—25.6	2	2	2	2	....	....
25.7—28.1	6	7	4	5	6	....
28.2—30.6	13	13	12	12	6	....
30.7—33.1	41	44	33	31	28	....
33.2—35.6	143	154	121	113	78	....
35.7—38.1	393	399	385	370	300	....
38.2—40.6	322	310	345	360	417	333
40.7—43.1	63	55	79	81	133	667
43.2—45.6	12	10	13	23	28	....
45.7—48.1	2	2	2	2	....	....
48.2—50.6	1	2	1	1	....	....
50.7—53.1	†	†	1	....	6	....
53.2—55.1	....	....	....	....	....	....
TOTAL CASES IN ARRAY	22,888	15,866	5,560	1,279	180	3

*Percentage, spine-length of total height.

†Less than .5.

See note at foot of Table 7 for explanation of height and build classes.

3. RELATIVE SPINE-LENGTH AMONG TALL OVERWEIGHTS.

Tall overweights were counted in 8,607 cases, and 5,676 (66 per cent.) fell into the 15 pounds excess weight group. Excessive overweight (48 pounds or more for height) was observed in 667 cases, or 7.7 per cent. Exceptional spine-lengths, that is, measurements beyond the range of normal variation above the mean, were identified in 1,207 or 14.0 per cent. of the cases. Below the mean, and beyond the standard deviation limit, there were 1,224 or 14.2 per cent. of the cases. The tall men furnish a larger proportion of exceptional relative spine-length cases than do short men or men of medium or average height. (See Table 13.)

TABLE 11.

Frequency Per 1,000 of Specified Relative Spine-lengths* Among Tall Men Overweights, by Build Classes. Union Central Policy Issues, 1887 to 1907.

Relative Spine-length*	Build Class					
	All Build Classes	1	2	3	4	5
TOTAL CASES	1,000	1,000	1,000	1,000	1,000	1,000
Relative Spine-length:						
18.2—20.6	....	....	....	....	....	....
20.7—23.1	1	1	†	....	....	....
23.2—25.6	3	3	3	2	....	....
25.7—28.1	4	4	4	10	....	....
28.2—30.6	14	14	16	7	29	....
30.7—33.1	38	39	35	37	14	....
33.2—35.6	179	184	182	123	145	....
35.7—38.1	441	452	419	436	348	500
38.2—40.6	235	229	240	269	290	250
40.7—43.1	69	60	83	96	159	250
43.2—45.6	10	8	11	19	14	....
45.7—48.1	5	5	6	2	....	....
48.2—50.6	1	1	1	....	....	....
50.7—53.1	....	....	....	....	....	....
53.2—55.1	....	....	....	....	....	....
TOTAL CASES IN ARRAY	8,607	5,676	2,264	594	69	4

*Percentage, spine-length of total height.

†Less than .5.

See note at foot of Table 7 for explanation of height and build classes.

Among all men in the experience, the mean relative spine-length was 36.8, and among tall overweights, 37.1.

4. SUMMARY OF FACTS ON OVERWEIGHTS.

We have in these observations of 38,062 overweights at the several height and build classes a rich field for investigation. It will be possible to learn how the ratio of actual mortality in the groups with presumably favorable relative spine-lengths compares with that expected under the norm table which we purpose to compile for all "standard" lives in the Union Central experience. When these facts become available, it will be possible to refine our judgments on overweights, having in mind the important bearing of spine-length in its relationship to total height. This latter factor is the only one which is at present taken into account with weight in current underwriting practice excepting perhaps the few

cases where abdominal girth does or does not exceed chest girth. Further displays of the anthropometric data will be made in order to provide sidelights on the classes of risks for special mortality investigation. These facts will be reported upon in the detailed report of the Committee.

TABLE 12.

Characteristics of Relative Spine-length (Percentage Spine-length of Total Height) for Overweight Men in Respective Build Classes According to Height Groups.

Characteristics; Build Group	Height Group		
	Short Men	Men of Average or Medium Height	Tall Men
Mean relative spine-length:			
Build group—			
All overweights:	37.650 ± .026	37.404 ± .013	37.131 ± .021
1.....	37.493 ± .031	37.268 ± .015	37.033 ± .025
2.....	37.948 ± .052	37.661 ± .026	37.242 ± .042
3.....	38.022 ± .101	37.821 ± .053	37.544 ± .079
4.....	37.991 ± .293	38.469 ± .145	37.878 ± .237
5.....	*	41.100 ± 3.312	38.800 ± 2.551
Standard deviation:			
Build group—			
All overweights:	3.080 ± .018	2.867 ± .009	2.873 ± .015
1.....	3.030 ± .022	2.872 ± .011	2.835 ± .018
2.....	3.146 ± .037	2.825 ± .018	2.950 ± .030
3.....	3.183 ± .072	2.824 ± .038	2.868 ± .056
4.....	3.225 ± .207	2.887 ± .103	2.925 ± .168
5.....	*	8.505 ± 2.342	7.564 ± 1.804

*Only two cases in classification.

TABLE 13.

Number and Percentage of Cases in Each Build Class (Overweights Only), Showing Relative Spine-length in Excess or in Deficit from the Mean by an Amount Greater than the Standard Deviation. Height Groups Distinguished.

Build Group	Short Men				Men of Average or Medium Height				Tall Men			
	Relative Spine-length in Excess of Standard Deviation				Relative Spine-length in Excess of Standard Deviation				Relative Spine-length in Excess of Standard Deviation			
	Below mean		Above mean		Below mean		Above mean		Below mean		Above mean	
	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.
All overweights:	963	14.7	839	12.8	3,282	14.3	2,789	12.2	1,224	14.2	1,207	14.0
Build Class												
1.....	653	14.9	540	12.3	2,327	14.7	2,008	12.7	807	14.2	798	14.1
2.....	236	14.1	220	13.2	761	13.7	622	11.2	328	14.5	318	14.0
3.....	66	14.7	70	15.6	173	13.5	136	10.6	79	13.3	80	13.5
4.....	8	14.5	9	16.4	21	11.7	23	12.8	10	14.5	11	15.9
5.....	*	*	*	*	*	*	*	*	*	*	*	*

See note at foot of Table 7 for explanation of height and build classes.

*Insufficient data.

NOTE.—The above numbers and proportions were obtained by calculation from the crude distribution according to relative spine-length frequency classes.

TABLE 14.

Summary of Mean Measurements for Total Group Included in Union Central Policy Issues Described in Preceding Tables.

MEAN MEASUREMENT	VALUE
Height	68.67 inches
Weight	156 pounds
Chest	35.9 inches
Spine-length:	
Absolute	25.1 inches
Relative	36.81 per cent. of total height

Dr. Grosvenor—Dr. Martin will present his paper on Pleurisy.

PLEURISY IN RELATION TO LIFE INSURANCE.

By C. F. Martin, M.D.

In discussing the relation of any given disease to life insurance, I take it that there are two main viewpoints from which the subject may be considered—the one (the Examiner's) referable to the elegibility of a risk as such; the other, and broader, view refers to the consideration of the disease as a group (the Medical Director's). In the case of pleurisy, the study of the disease as a group presents many difficulties.

Various etiological factors, and they *are* varied, have so much to do with the prognosis of the disease that it becomes very difficult to form any conclusions as to the ultimate outlook. On the other hand, I think it possible to state in a general way how insurance may be affected in a given group of pleurisies where the past history has shown a very distinct etiological factor. It is also, I think, possible to suggest the general rules by which an Examiner should be guided in accepting the risks at ordinary rates.

I would like to state at the outset that our information on this whole subject is strangely lacking in the literature, and Medical Directors of Insurance Companies are at a distinct disadvantage.

As has already been suggested by the authorities of the Metropolitan Life Insurance Company, an excellent service might be rendered to the cause of life insurance were some united effort made to ascertain more definitely the after history of specific groups of cases in whom a past history of pleurisy has been found; but this can only be done by giving special attention to the etiological factors and their respective after-effects. The whole subject entails a study of a much wider range than this brief paper could undertake, for in its widest application, the scope includes a consideration not only of all the acute cases, with their etiological factors, but also the chronic conditions leading to more or less fibrosis of the pleura.

To these must be added the post-operative empyemata and chronic contractions of the lung tissue, many of which enjoy a very prolonged course without a fatal termination.

In my short study of this aspect of pleurisy, I have been led to conclude that the interest and importance centre chiefly about the cases of so-called "primary" or "idiopathic" pleurisy. When a pleurisy is the only local manifestation of infection, it is said to be "idiopathic" or "primary" in contradistinction to the pleural infections due to propagation from the neighborhood, or to bacterial emboli from some distant focus of infection, which are regarded as secondary or tertiary. As a matter of fact, all pleurisies are secondary to some infective or other cause, and the terms "primary" or "idiopathic" have reference merely to the fact that the cause has not been found.

An inspection of autopsy protocols is very illuminating in this connection. In the first place, it leads to the obvious conclusion that pleurisy must be a very frequent, a very insidious and a very easily-induced malady. Consider alone the incidence of adhesions in various parts of the pleura as found at autopsy. At the Royal Victoria Hospital, Montreal, this is approximately 90 per cent. of all autopsies. These adhesions, while more commonly apical, are frequently found elsewhere over the pleural surface—sometimes slight, sometimes dense enough to obliterate the pleural cavity. In the second place, the past history of a large majority of these cases reveals no cause whatsoever, no record of any thoracic disease to which the old pleurisy could be ascribed, and in perhaps 50 per cent., no sign even of pulmonary tuberculosis. I speak of these as "old pleurisies," because, after all, what else can they mean? The incidence of adhesions indicates some previous irritation; something, in other words, enough to cause inflammation of an acute or subacute type—in a large majority of cases a pre-existing focal infection, not necessarily tuberculous in origin. This may occur as a result of any infective process; e.g., typhoid fever, influenza, etc., or by extension from a suppurative process, or embolic, as a tertiary manifestation. This, I think, is extremely important, implying as it does, that applicants with evidence of old focal apical

pleurisy need not necessarily be considered as subjects of tuberculosis.

Rist drew attention in the early days of the Great War to the frequency with which clinical evidences of apical pleurisy occurred not due to any tuberculosis but to some catarrhal conditions of the upper respiratory passages, and which, in his experience, were neither tuberculous in origin nor did they lead to any subsequent tuberculous infection.

Again, it was suggested some years ago that the pleura, in its anatomical relations to the lung, resembled the cavity of a joint, and that, just as in joints, focal infections were extremely natural, so the same condition might occur in the pleura, let the cause be a tuberculous virus, a streptococcic infection, influenza, or any other type of general bacterial invasion. The discovery of stomata on the pleural surface, which communicated with the lymphatics of the diaphragm, lungs and the thoracic walls, tended to confirm this view. In other words, if this be correct, we must accept the fact that *insidious dry pleurisies are very common, that they are not by any means always tuberculous in origin,* and that they must be regarded as evidences of some infection arising from a focus in the body, be it far from or near to the original point of attack. This, as I have said, has reference chiefly to the incidence of pleurisy as a *pathological* finding at autopsy.

We come next to the *clinical* pleurisies, i.e., those that have occurred with physical evidences—pain, dyspnoea, friction rubs, effusion, etc. In other words, clinical "dry" and "wet" pleurisies. Here we have statistical evidence which affords a certain amount of valuable information for insurance purposes. While most of these records deal chiefly with the incidence of tuberculosis, some, again, refer to pleurisies arising from other causes, and I shall try, briefly, to summarize these as well.

It is generally considered that pleurisy is always infectious in origin, generally due to exposure—cold, etc., offering lowered resistance. "Cold" and "Rheumatism" as primary and sole etiological factors are, as a matter of fact, more or less legendary.

When a dry or wet pleurisy terminates favorably, adhesions

occur, and the pleural cavity becomes more or less obliterated. Very often a careful physical examination fails to reveal any pathological change, even after purulent effusions, and the thorax may appear to be quite normal. On the other hand, the usual signs indicative of a past pleurisy are commonly, local flattening of the chest; a diminution of expansion, retraction of the part involved, or, perhaps, some unilateral contraction. The more marked the signs, the greater can the adhesions be assumed to be. In the underlying lung there may be carnification or contracting fibrosis, and the lung, as a result, may be very greatly diminished in size. Under such conditions, there will often develop a dilatation of the heart, the symptoms of which may be the terminal stage of the illness.

Of the non-tuberculous pleurisies, the commonest are those from the pneumococcus, the streptococcus, the rheumatic virus, the typhoid bacillus, or from the causative germs of influenza, scarlet fever and diphtheria. Then, too, the respiratory infections resulting from measles and influenza predispose to secondary invasions by the S. haemolyticus, B. influenzae, pneumococcus and mucosus capsulatus. Or, again, the colon bacillus may be associated with the onset of the pleurisy. Any of these causes may induce a dry or wet pleurisy, and the effusion, when it occurs, may be serous, purulent or haemorrhagic. In Koester's statistics, out of 650 serous pleurisies—

76 were rheumatic,
17 associated with nephritis, and
5 with typhoid.

In pneumonia it must be remembered that pleurisy is part of that disease—not a complication, and in broncho-pneumonia following measles, it is usually a low-grade infection from Pneumococcus type 4.

In another series of 40 pleurisies—

17 were purulent,
16 serous, and
7 haemorrhagic.

In all these pleurisies, the important point in relation to life insurance depends far more upon the etiological factor than upon the type of the pleurisy. I leave out of consideration altogether all low-grade types of pleurisy which accompany chronic nephritis, arterio-sclerosis and the protracted diseases, inasmuch as these are usually terminal in their character, and hence are of no interest in the present discussion.

With reference to those non-tuberculous pleurisies as a group, one may say in general that any applicant for life insurance with a past history of pleurisy following upon any of the above diseases, is eligible only in so far as the infection is remote and the activity of the germ as a factor has been removed. These forms of pleurisy do not *per se* lead to tuberculosis. It is my belief, judging from the evidence at autopsy, that this variety of pleurisy forms by far the largest group, though the majority do not afford clinical evidence either in the history or in the clinical findings; they are, to a large extent, "silent" pleurisies, in which often no clinical evidence has occurred, and the adhesions found at autopsy form the only basis upon which we can conclude that a pleurisy existed.

Where the pleurisy is clinical in its type, one may say in general that the dry pleurisies have a better prognosis than the wet, and that they are less serious. Further, that in wet pleurisies the longer the existence of the effusion, the graver is the outlook, because, usually, the etiological factor is a more serious menace to life.

Idiopathic (Clinical) Pleurisies.—Many statistics are available, and the most comprehensive and illuminating are those of Allard and Koester. These investigations cover a large series of cases, all of which have been thoroughly examined from time to time over a number of years, and the diagnosis in each instance was based on definite clinical signs. In the fatal cases, the postmortem statistics were taken from the State records.

Allard's cases numbered 200 selected during the years 1881-93. In all these cases the history of pleurisy had occurred at least 15 years prior to examination. Of the 200, 180 were serous pleurisies and 20 were dry. Koester examined the rec-

ords of 2,123 cases of pulmonary tuberculosis, and 650 cases of idiopathic pleurisy. Of the cases of idiopathic pleurisy, some had definite coexisting tuberculosis, while others could not be followed up with accuracy and were omitted from his series. In this way, his ultimate selection resulted in the investigation of 334 cases of idiopathic pleurisy occurring between the years 1894 and 1908, and the examination of these cases was continued up to 1910.

Briefly, the study covered the following points:

(1) Statistics re cases of pulmonary tuberculosis with a past history of pleurisy.

(2) Conversely, cases of pleurisy in whom tuberculosis developed later.

(3) Statistics referring to the time of onset of tuberculosis after the initial pleurisy.

(4) Statistics referring to the age incidence of tuberculosis in cases with a past history of idiopathic pleurisy.

(5) Statistics as to the date of death after the first attack.

To these, in my tables, are added some notes from other authorities which touch upon the same topic.

TABLE I

Incidence of Pleurisy Prior to Definite Pul. Tbc.

KOESTER	2,123 Case Records of Pulm. Tbc.	172 had past history of Pleurisy = 8.1%
WINYAH	1,000 Case Records of Pulm. Tbc.	201 had past history of Pleurisy = 30%
SANATH PHIPPS	5,895 Case Records of Pulm. Tbc.	1,303 had past history of Pleurisy = 23.8%
FLINT	Several hundred Case Records of Pulm. Tbc.....	22 had past history of Pleurisy

TABLE II

Cases of Pleurisy which Subsequently Developed Tbc. of Lungs

Dry and Serous Pleurisy

Authority	No. of Cases	No. Healthy After 15 Yrs.	No. Dead of Tbc.	No. Alive c Tbc.	Died of Other Causes
ALLARD—Wet.....	180	81	57 (45%)	24	18
Dry.....	20	6	4	4	6
KOESTER—Wet....	334	147	58 (49%)	106	23
Dry....	58	37	4	12	5
BOWDITCH.....	90	—	31 (35%)	1	—
GOODALL.....	450	—	193=43%		—
SEARS.....	562	—	(13%) in 17 years		5 Pleurisy 1 Empyema 3 Bronchitis 1 Oedema of Lung 3 Meningitis
	439				
FIEDLER.....		—	28 (in 2 years)	—	—
CABOT.....	92	—	(15%)		—
BARRS.....	152	—	21	—	—
OTHERS.....	57	—	178=57%		—
	103	—	189=33%		—

TABLE III

Time of Onset of Tbc. Pulm. After Occurrences of Pleurisy

Yrs. after Pleurisy	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11–15	16–20	21
No. of Cases (154 Serous Pl.).....	33	21	11	22	14	11	7	7	5	5	10	6	2

i.e. 65.6% in 1st quinquennium
22.7% in 2nd quinquennium
6.5% in 3rd quinquennium
5.2% in 4th and 5th quinquennium

Relative Time of Onset of Another Series: Onset of Tbc. After Pleurisy

Yrs. after Pleurisy.....	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11–15	16
Out of 106 Cases of Serous Pl.....	22	11	10	17	10	4	11	4	3	5	8	1

In 37 Cases the Onset of the Tbc. After the Dry Pleurisy, According to Years, was as Follows:

Dry Pleurisy

Year.....	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
No. of Cases.....	11	8	—	4	2	6	—	4	1	1

i.e. 25 = 67.7% in 1st quinquennium
12 = 32.3% in 2nd quinquennium.

TABLE IV

Time of Death from Tbc. After Pleurisy

Of 334 Cases 58 Died

Years after Pleurisy (Serous)	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11–15
No. of Cases.....	18	11	8	5	7	2	1	2	1	1	2

i.e. 85% in first 5 years.
Sears gives 40% in first 2 years.
31% in 2nd to 5th years.
12% in 5th to 10th years.
16% in 3rd quinquennium.
Total percentage in first 5 years = 71%.

Of 514 patients arranged according to the age incidence of tuberculosis, it is obvious that the percentage of cases in which tuberculosis develops after idiopathic pleurisy, varies very widely. The following table illustrates this fact:

TABLE V

Age Year	Living		Died from Tbc.	Total Per cent Tbc.	Died from Other Causes	Total
	Healthy	Tuber-culous				
1– 5	61%	23%	9%	33%	4%	21
6–10	70%	15%	15%	30%	—	40
11–15	58%	23%	15%	39%	2%	51
16–20	50%	31%	18%	50%	—	64
21–25	41%	34%	20%	54%	4%	90
26–30	49%	23%	23%	47%	2%	67
31–35	24%	28%	32%	60%	15%	53
36–40	32%	24%	27%	51%	16%	37
41–45	26%	26%	38%	65%	7%	26
46–50	35%	20%	25%	45%	20%	20
51–55	44%	11%	22%	33%	22%	9
56–60	23%	11%	41%	53%	23%	17
61–65	40%	—	10%	10%	50%	10
66–70	60%	20%	20%	40%	—	5
Over 71	25%	25%	—	25%	50%	4

It will be seen from these tables that pleurisy in itself is not often a fatal disease; moreover that it is uncommon as compared to pulmonary tuberculosis. De Haviland Hall records that in an examination of 126 cases of phthisis followed over 25 years, only 4 had a previous history of pleurisy. In Koester's statistics, 8.1% had a similar history, though others again lead one to believe that the records of patients dying of phthisis will have a larger percentage with a previous history of pleurisy.

The above tables show that tuberculosis develops after "*idiopathic*" pleurisy in a fairly large percentage of cases in adults, approximately from 30-50%. In children, on the other hand, the percentage is lower. It may be said in general that in children under 15 years of age, only 20-30% develop tuberculosis following idiopathic pleurisy.

It will be noticed, further, that the onset of tuberculosis is most frequent in the first quinquennium in adults. The death rate is about 85% of the fatal cases in the first five years. In children, on the other hand, this is somewhat less. The onset

is most frequent in the first decennium, and the death rate much smaller.

Idiopathic pleurisy with effusion is more serious, and is more often followed by tuberculosis than dry pleurisy.

Lastly, one must recognize the fact that the mere incidence of idiopathic pleurisy in a past history does not of itself exclude from life insurance, even from a standard risk.

Certain principles may be laid down for the guidance of examiners in *the selection of standard cases* where the past history indicates an idiopathic, or a secondary pleurisy:

(1) The family history must be clear of tuberculosis.

(2) Five, or preferably, ten years must have elapsed between the attack of pleurisy and the acceptance of the applicant as a standard risk.

(3) It should be accepted with reserve if the applicant is subject to recurrent acute catarrh of the respiratory passages; all the more so if there is a history of previous disposition to tuberculosis or arthritis.

(4) The occupation must be such as not to predispose to tuberculosis; i.e., an occupation which involves a sedentary, confined, or an unhealthily exposed life is unfavorable.

(5) The habits of the applicant should be without a flaw, and his general regime be one that involves a healthy out-of-door life.

(6) The general state of health at the time of examination is important. The color, general appearance, and the weight should be exceptionally good.

(7) Wherever a past history of pleurisy exists, a thorough examination should be made for evidence of tuberculosis in the lungs, glands, and elsewhere.

(8) The lungs must, of course, be free from *any* evidence of disease.

(9) A moist pleurisy is to be considered more serious than a dry one.

The relation of pleurisy to pulmonary tuberculosis in *children* deserves special interest, for reports seem to conflict. According to Neuland, most children develop tuberculosis or

die within 5 years of the attack even when no history of tuberculosis or physical findings in the chest can be discovered.

Hamburger records that pleurisy in children is never anything but tuberculosis, yet admits that the proof is lacking.

In general, one may say, judging from the consensus of written opinion, that in the very young (under 10 years), the outcome of an idiopathic pleurisy is more favorable than that in adult life.

A note may be added on the significance of evidence of tuberculosis from various *tests* of pleural fluids. The etiological study of pleural fluids has demonstrated that a very large percentage show lymphocytosis, and so frequently is this the case that it is of great use in diagnosis. Musgrave, by cytological test, estimated 65% of all pleurisies as tuberculous. Nevertheless, a lymphocytosis cannot be regarded as pathognomonic, for a not inconsiderable proportion of cases show a preponderance of polymorphonuclear cells, due either to invasion of other bacteria, or to a special virulence of the tuberculous infection. Animal inoculation of pleural fluid gives rather unsatisfactory results, for whereas a fair proportion—(65-70%) of the fluids inoculated give positive results, no definite conclusion can be drawn from negative reactions.

It is well recognized that in tuberculous infections, the bacilli tend to remain on the walls of serous cavities rather than to swarm in the fluid, so that the small number present in an effusion may not be sufficient to give positive results in ordinary inoculation tests. Eichhorst found 65.2% of 23 cases of serofibrinous pleurisy to be tuberculous by this method, while Le Damany obtained similar positive results in 86% of 55 cases. At least 15-20 c.c. of fluid should be injected.

All authorities agree that the injection of fluid into guinea-pigs is not always satisfactory.

Nor is the *tuberculin* test in itself sufficient proof that an existing pleurisy is or is not tuberculous.

Nobel and Steinbach failed to get tuberculin reactions in one-half of 78 cases tested; 43 of their children were cured, but they concluded that where no other cause is found, the pleurisy

must be regarded as tuberculous if the tuberculin test is positive. Of 45 cases examined by them, 24 were followed up;; all had given positive tuberculin tests at the time of the pleurisy, and 18 of these were still in good health for a period of from 1-10 years later.

The acceptance of the risk as a sub-standard one would naturally depend upon the quality of the impairments considered in the above, and also to their number. No case, however, is acceptable as a risk where the duration of time since recovery has been less than a year, where the family history is definitely tuberculous, or where the lungs show any evidence of active disease.

While it is difficult to generalize on the degree to which applicants with a past history of pleurisy should be penalized, the evidence goes to show that where the applicant is in fair health only (by this, I mean, not sufficiently robust to be called a standard risk), an extra must be imposed.

If the pleurisy has preceded application by less than a year, he is scarcely eligible; if by 3-5 years, an extra of at least 6-8 years is called for, especially if between the ages of 20-30 years. A less severe penalty is due those after 40 years of age, in whom the onset of tuberculosis is much less common.

To lay down more definite rules on substandard cases is both unwise and unjustifiable, for in all standard applications of this nature, the elements of risk involve too many individual data to permit of useful generalization.

Empyema usually follows some infection from within the chest, more commonly a pneumonia, lobar or lobular, or an influenza; and, less commonly, some septic focus associated with pus organisms, more especially streptococci;; whereas tuberculosis is less commonly the etiological factor.

The pleural effusions of children are far more often purulent than is usually recognized; the condition, however, is often less virulent and more amenable to cure without a major operation.

The modern treatment of empyema tends to increase the percentage of permanent cures, and, to some extent, has mini-

mized the risk of death as a remote cause. Nevertheless, empyema has a very high death rate, and must be considered as a serious disease, and still more serious as a complication.

The remote prognosis, and, therefore, the eligibility for insurance, depends chiefly on three factors:

(1) The removal or obliteration of the cause of the disease as an active process or factor.

(2) The general condition of the applicant after healing is established.

(3) The local condition of the chest with reference to adhesions and contractions, thereby limiting respiration, contracting lung tissue, and affecting the circulation.

Any or all of these may, again, predispose to further troubles, and act as determining factors in the prognosis when any future disease whatsoever attacks an applicant.

It is difficult to generalize on groups of empyemata without consideration of the causes in each instance; for example, the eligibility of an applicant with an empyema of tuberculous origin is entirely different from that of a purulent pleurisy of metapneumonic type; and again, the empyemas of children may differ in their outlook from those of adults following influenza.

For this reason, the statistics of Hunter can be used only as of general actuarial interest, and in the light of modern investigation, cannot be considered as very satisfactory. I give them, however, as illustrative of what is probably the only available or published statistics on this subject.

Two groups are discussed:

(1) Cases with a history of empyema within five years of application—233 cases: 12 deaths, i.e., ratio of actual to expected death—158 per cent.

(2) Those in whom empyema occurred more than five years since the application—403 cases, 14 deaths, i.e., ratio of actual to expected death—104 per cent.

Nine of the 26 deaths were ascribed to tuberculosis.

What recommendations can we give to Examiners?

(1) A history of empyema demands special rating, and for several years after healing has occurred, the possibility of a re-awakening of a latent infection must be considered. The scarred or thickened or adherent pleura renders the case a sub-standard one.

(2) If the operation has been performed some years previously; if but a portion of one rib has been excised and the wound has healed thoroughly and rapidly (say within two months), and if the applicant has remained in good health for several years since the operation, the risk is worthy of consideration.

The basis on which acceptance may be considered depends chiefly on the following factors:

(1) The duration of time since the operation.

(2) The etiological factor—as far as can be determined.

(3) Family history.

(4) The general regime, the habits and the occupation of the applicant.

(5) The applicant's general condition on examination.

(6) The local state of the lung involved; the evidences of pulmonary lesion; expansion, entrance of air into the lungs, etc.

Any applicant with a history of empyema successfully cured is entitled to every consideration from a Life Insurance Examiner if, after five years, he has no other signs in his chest than the healed wound and moderate pleural thickening, provided his family history is good, his occupation healthful, and his physique satisfactory. Any empyema history, however, renders the applicant substandard. It is only a matter of degree.

Chronic Pleurisy may be wet or dry.

The applicants with chronic pleurisies with effusion, in which the fluid remains for months or years, are, of course, ineligible during that period.

The dry pleurisies of long duration are for the most part secondary to an effusion, and, as a result, show local lesions: Flattening of the affected side, with diminution of expansion, of

resonance and of breath sounds. There are, of course, adhesions, and the resulting deformity is often great. Nevertheless, the chronicity of such cases, especially those following simple serous effusions, is often astonishing, as such patients live for years without, apparently, any signs otherwise of illness. As insurance risks, they are worthy of consideration, though substandard in type.

The worst type, i.e., those following empyemata, more especially those which have healed without operation, give the most marked deformities of the chest, and are less eligible for insurance.

One should not omit to mention a primitive dry pleurisy in which adhesions, often very extensive, may form, and yet leave little evidence on examination of any impairment. The physical signs vary within a wide range. A few of these cases are tuberculous.

Statistics that would be of value for insurance purposes should include:

(1) Analysis of the late results in:

1. Pleurisies: serous and purulent, following a group of:
   (a) Frank pneumonias.
   (b) Bronchopneumonias.
   (c) Influenza.
   (d) Streptococci invasions.
   (e) Trauma.
2. Purulent pleurisy in young children.
3. The incidence of tuberculosis in persons with a history of metapneumonic empyema.

(2) Analysis of late results in groups of pleurisies in which the bacteriology has been carefully studied in its etiological relationship.

(3) Analysis of mortality statistics in persons with chronic thickening of the pleura following:

1. Serofibrinous pleurisy.
2. Purulent pleurisy.

DISCUSSION

Dr. Grosvenor—Dr. W. B. Bartlett will open the discussion of Dr. Martin's paper.

Dr. Bartlett—The importance of a history of pleurisy in an applicant for insurance is entirely dependent upon whether the pleurisy was of tuberculous origin or not. While many cases of pleurisy are of such origin it must not be forgotten that any affection of the lung that reaches the surface will set up an inflammation of the pleura. This inflammation may result in either a dry pleurisy or in a pleural effusion. Pleurisy is thus not only a frequent complication in pulmonary tuberculosis but also frequently occurs in pneumonia, influenza, bronchiectasis, and lung abscess. When occurring secondary to these latter diseases its importance from an insurance standpoint is entirely that of the original disease provided recovery has been complete. When, however, as a result of the attack the pleura is permanently thickened or the expansion of the lung interfered with through the formation of adhesions, we must consider the case impaired, the degree of impairment depending upon the extent of the lesion.

Dry and wet pleurisy and empyema are all different stages in the same pathological process but it is helpful to remember that infection with the tubercle bacillus usually produces a clear fluid or a deposit of fibrin while the pneumococcus produces a turbid fluid or the formation of pus. Empyema is almost always secondary; the pneumococcus and streptococcus being the usual causative agent and the condition following pneumonia, lung abscess or trauma in the vast majority of cases; hence if completely recovered from it is of less significance from an insurance standpoint than a simple pleural effusion.

The form of pleurisy most important from our standpoint is the so-called idiopathic pleurisy; that is, the pleurisy which comes on in a previously healthy individual without apparent cause and which is usually attributed to "catching cold" or to sitting in a draft. In order to judge the importance of this symptom we must obtain a very careful history in every case.

Many times a simple attack of muscular rheumatism, muscle strain, or intercostal neuralgia is called pleurisy and it would be unfair to the applicant to refuse him insurance with such a history. If the diagnosis is clear and the attack occurred within recent years it is customary either to reject the application or to offer a rated policy, the extent of rating depending upon the age of the applicant, the time elapsed since the attack, and also depending to a large extent on the weight and family history. The reason for such action is based upon the fact that a large proportion of such pleurisies are tuberculous in origin. Some writers even claim that 98% are tuberculous.

The after history of pleurisy cases has been investigated by many observers whose figures on the whole agree that from 30 to 40% ultimately develop or die from tuberculosis.

Medico-actuarial investigation showed that when pleurisy occurred within five years of application the death rate from tuberculosis of the lungs was three times the normal.

Noble reporting from the University Children's Hospital in Vienna is of the belief that almost all cases of pleurisy in children are of tuberculous origin. He was able to re-examine 39 children after a considerable interval of time but found lung changes traceable to the pleural infection in only 10%. He concludes that the prognosis of tuberculous pleurisy in children is quite favorable and that the propagation of tuberculosis in such children is scarcely to be feared. This coincides with our present view in regard to childhood infection which so often renders the individual immune to infection with the tubercle bacillus in later life.

Dr. John B. Hawes has called attention to the fact that the recent influenza epidemic has upset our preconceived ideas in regard to lung infections in several instances. He says: "We were all of us taught, no matter what medical school we attended, that wet pleurisy coming on insidiously was practically always, and a dry pleurisy often, a form of tuberculosis. Since influenza, however, a pleurisy wet or dry, is merely a pleurisy wet or dry. It does not necessarily mean tuberculosis. I rather feel that such a comforting thought as this is apt to be carried

to an extreme and I still am apt to look upon a wet pleurisy as a manifestation of tuberculosis."

In a paper read before this Society in 1918 I suggested the following method of treating an applicant giving a history of pleurisy:

First, as complete a history as possible of the attack should be obtained.

Second, if the pleurisy follows pneumonia or accompanies some other acute infection, the risk need not be considered impaired.

Third, if the pleurisy is primary,—the so-called idiopathic pleurisy,—a postponement of ten years from the time of the attack is indicated before the applicant can be considered a standard risk; although in applicants over thirty-five years of age, a five-year postponement might be sufficient if other conditions were very favorable; the family history of the applicant and his build being of course important factors in weighing the risk.

I have learned nothing since to cause me to modify these opinions.

In conclusion, let us not forget that in dealing with an applicant giving a history of primary pleurisy we are in reality dealing with a case of arrested tuberculosis.

Dr. Gordon Wilson—I must apologize for not having prepared a discussion, but I read the paper only yesterday.

I think, of course, the group that interests us most is the tubercular group and it is the group that has grown in interest since the granting of disability benefits, as tuberculosis accounts for so much of our loss under that head. We are all familiar with the fact that in round numbers, ten per cent. of our deaths are due to tuberculosis, and those deaths occur in the policy-holders entering at young ages, and a short duration of policy life means a heavy loss. In these cases I think the clinical experience alone is of value, and the experience of such places as Saranac is most valuable, and there they consider the

diagnosis of tuberculosis as positive if the patient has had pleurisy with effusion.

There is one point of special importance that I would like to bring out, and that is in our ratings and in our final decisions as to the acceptance of a possible tubercular risk we should pay more attention to the question of occupation. Osler expressed it very well when he said a man's recovery depended more upon what he had in his head than what he had in his chest, and in a measure it also depends on dollars and cents. We have got to take thought in regard to the occupation, whether it is an occupation which brings big earnings with very little muscular effort or the reverse. A bad example of such action was brought to my attention some years ago, when a young doctor who had had a slight tubercular infection applied for insurance. At that time he was a house officer in a well run Sanatorium, and had been there for three years. He was declined insurance, but was informed that it would be granted if he left the Sanatorium and went into "General Practice". As a matter of fact he was living under ideal conditions in the sanatorium, practically under no strain, whereas if he went into general practice his hours would be harder and he would be much more apt to break down.

Pleurisy with effusion in a laborer I wouldn't want to touch, but in a man of education and wealth who has the ability to take care of himself, I think we can accept under a proper rating.

Dr. W. R. Ward—This study of pleurisy by Dr. Martin shows an extensive research and is a valuable contribution to our Life Insurance literature. Dr. Martin has emphasized the necessity of endeavoring to ascertain the etiological factor in estimating the degree of hazard. It is well for us to keep this thought constantly before us.

Dr. Martin's study covers the three clinical types of pleurisy, namely, Dry Pleurisy, Pleurisy with Serous Effusion, and Pleurisy with Purulent Effusion or Empyema.

What shall be our action as we consider cases presenting these various types?

DRY PLEURISY

When an applicant's personal record shows a history of pleurisy without effusion, it is well for us to ask ourselves, "Was this actually a case of Pleurisy?" In this connection, let us remember that Hippocrates used the term "pleurisy" to designate all pains in the side, especially those of a severe character. It is an unfortunate fact that to some extent, this custom still prevails and that many persons are told that they have pleurisy when the diagnostic signs do not warrant such a statement. Too frequently an intercostal neuralgia or a muscular pain occurring in the course of an attack of influenza or of some other infectious disease is called pleurisy even though the pleura is not involved at all.

If, then, we have before us a record of pleurisy without effusion, the attack having been of short duration, and in an applicant free from any other evidence of a tubercular tendency, let us make careful inquiry into the exact nature of the illness before passing final judgment. If, upon further investigation, we find that the attack was of sudden onset and especially if it occurred during an influenza epidemic, we may exercise considerable liberality in acting upon the case. If, on the other hand, there have been recurrent attacks even though the duration of each may have been short, or if the applicant is of frail physique, with a low blood pressure or with a tubercular family record, then we should exercise far greater caution.

PLEURISY WITH SEROUS EFFUSION

Serous pleurisies are always suggestive of tuberculosis. In this connection the assertion that the effusion has been examined for tubercle bacilli and that these were not present should not deceive us for, Dr. Lawrenson Brown states that 75 per cent. of serous pleurisies are tubercular, and he also informs us that the tubercle bacilli can be found in the exudate of only 20 per cent. of these cases. He further states, "It is evident that the only safe course in dealing with sero-fibrinous pleurisy even

though no tubercular focus can be found, is to bear in mind its probable tubercular origin and treat the case accordingly".

Whitney of Denver, Colorado, states that from 70 to 80 per cent. of these cases are tubercular, and that although many may recover, at least thirty per cent. of all cases of serous pleurisy will eventually die of tuberculosis. Andrus of Philadelphia says, "I thoroughly agree with those authors who contend that three-fourths of the cases of sero-fibrinous pleurisy are of tubercular origin". Such statements from such authorities, should deter us from accepting these cases unless a sufficient length of time has elapsed to assure us either that the infection was not tubercular, or if tubercular, that no further extension may be apprehended.

In this connection our M. A. Statistics are very valuable. These statistics show that applicants with a history of pleurisy other than purulent, occurring within two years of the date of the application, have a mortality of 147 per cent. Furthermore, we observe, as we might expect, that the mortality is highest during the first five years, being 166 per cent. and that not until after ten years, does the mortality rapidly diminish. Furthermore, we observe that cases of pleurisy other than purulent that have occurred subsequent to two years but prior to five years from the date of the application, also give a high mortality, the mortality for the class being 146 per cent. On the other hand, cases of pleurisy other than purulent, which occurred more than five years prior to the application, gave a comparatively favorable mortality, the mortality for the entire class being 113 per cent. From these figures, which are based upon a study of 83,530 cases, we are forced to the conclusion that we cannot with safety accept cases with a history of pleurisy with serous effusion until at least five years have elapsed from the date of the attack, and even after that time, the cases should be selected with caution.

EMPYEMA

We have referred to the statement made by Dr. Lawrenson Brown that 75 per cent. of serous pleurisies are tubercular.

Dr. Brown also informs us that 75 per cent. of all empyemas are pneumo-coccic. If such is the case, and if tuberculosis is the only disease that we fear as a sequence of pleurisy, then it is obvious that we may be far more liberal in dealing with empyema than we are in dealing with cases of serous effusion. I am aware of the fact that our M. I. B. investigation shows a mortality of 158% for cases of empyema, which occurred within five years of the date of application, but there were only 12 deaths in this class. Consequently the class is too small to be of material value to us. The question then arises, "How shall we determine which of our empyema cases are tubercular and which are non-tubercular?" Here again, we must be guided in large measure by the clinical symptoms and by the concomitant conditions. If the applicant is of good physique, if the disease was of sudden onset, and especially if it accompanied a case of pneumonia or influenza, then we may be reasonably certain that the condition was non-tubercular, and unless the lung has been seriously damaged by contractions and adhesions, we may view the case favorably.

We all recall the severe influenza epidemic of 1918 and 1919, and we remember the large number of empyema cases that occurred at that time, the vast majority of which were non-tubercular.

In conclusion, I desire to submit the rules governing pleurisy, which the Mutual Benefit adopted some time ago.

PLEURISY WITH SEROUS EFFUSION

Postpone all cases for five years from the date of recovery. If applicant is of light weight, or there is evidence of tuberculosis in the personal or family record, it may be advisable to decline rather than to postpone.

EMPYEMA

If empyema is a direct sequence of an attack of pneumonia, or of influenza, and if the applicant is of good physique, and without evidence of a tubercular tendency either in the family

record, or the personal record, postpone two years from the date of recovery.

Dr. Martin (closing)—In summing up the matter of Pleurisy in its relation to life insurance, I would like to say that we have a somewhat similar problem to that which has just been referred as a Glycosuria and Albuminuria. It is always easy enough to form a general idea of the outlook in any given case of Nephritis, or Diabetes or Pleurisy, but in the investigation of Glycosuria and Albuminuria as contemplated, it seems to me that one must remember that one specimen of urine is not going to give us very much of an idea as to prognosis. The amount of albumin or the amount of sugar is not a criterion as to the outlook, and I trust that those who are making these investigations will deal with the whole subject of Glycosuria and Albuminuria on a much broader plane, so that at the end of 20 years, one may really have statistics that are worthy of record.

It is only by this means that in Pleurisy we are able to get any information that is of value. Statistics based on careful observation of facts are alone worthy of being quoted.

I would like to thank those who have taken part in the discussion, and would add that I am heartily in accord with what has been said, particularly with the remarks of Dr. Wilson on tuberculous pleurisy, which coincide, I think, with the nine points I endeavoured to put down for Life Insurance Examiners.

Dr. Grosvenor—Dr. Huston has requested that his paper be read by title only, because of the lack of time. I am sorry for I am sure we would all have enjoyed hearing Dr. Huston read it. Dr. Truitt will open the discussion of Dr. Huston's paper.

GLYCOSURIA—
ITS IMPORTANCE IN LIFE INSURANCE SELECTION

By Ross Huston, M. D.

Medical Director, Bankers Life Company, Des Moines, Ia.

Glycosuria is the chief symptom of diabetes mellitus. Diabetes mellitus is a disease characterized by abnormal metabolic changes of the body, particularly as to the breaking up of glucose into an active form after it has been absorbed into the blood from the intestine. It has been known as a disease of metabolism since Willis, who died in 1675, described it as such. Dobson (1775) who was the first to write of it in English, described the sweet in the urine found in this disease, as sugar. Cawley (1788) also demonstrated sugar and described a pancreatic lesion in a necropsy of a person who had died of diabetes. Cullin (1709-90) added the descriptive adjective "mellitus" to the name of the disease.

It is generally agreed that impaired pancreatic function is the principal cause of diabetes mellitus. Glycosuria is almost always found as a symptom of the disease but is also found in cases which prove not to be diabetes. In the business of life insurance selection, the importance of this impairment cannot be exaggerated. It has been estimated that the number of people in the United States who are frank or potential diabetics is as high as two million. It is not surprising, therefore, that the impairment is frequently met in examinations for life insurance. In his paper two years ago, Dr. Joslin reported that in one group of three hundred of his patients, thirteen per cent showed sugar first at a life insurance examination.

The Medical Director of a life insurance company must base his opinion of the risk upon the report of a doctor who is usually of ordinary ability. The examination is not always made under the most favorable conditions and very often the applicant takes the attitude that the Company may find out, if they can, his true condition.

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Insurance impairments are usually impairments of slight de-

gree. Few people apply for insurance who have gross pathological lesions or who have advanced diseases. Probably ninety-eight per cent of the impaired risks applying for life insurance believe themselves to be in normal health. When sugar is found in the urine in examinations for insurance, it is usually of a low per cent and perhaps may be overlooked by a careless examiner. Unless we have reason to suspect diabetes through honest history record or knowledge of the examining physician, we do not have a Home Office specimen of urine to check the analysis except when the amount at risk requires such additional examination.

The fact that the examining doctor does not report sugar while a Home Office examination may reveal its presence upon a later date, is not always a criticism of the doctor's methods because a mild or potential diabetic does not constantly show sugar. Physiological glycosurias are found under certain conditions. The examining doctor may have secured his negative specimen several hours following the intake of a meal, while the Home Office specimen is usually timed as to the intake of food.

KIDNEY THRESHOLD.

The point at which the kidney is permeable and sugar appears in the urine is known as the renal threshold. This varies in different people and in the same person under different conditions. The presence of sugar in the urine is usually due to one or more of the following factors:

1. A disturbance of carbohydrate metabolism—diabetes mellitus.
2. The ingestion of carbohydrates in excess of the normal limits of assimilation.
3. Abnormally low renal threshold—so-called renal diabetes but not true diabetes.

The renal threshold may be influenced by certain drugs, emotional disturbances, or complicating diseases of the kidney. Bright's disease frequently causes an abnormally high renal threshold which accounts for the absence of glycosuria in many

cases, especially among elderly people. Sugar may be absorbed faster than stored in the liver or oxidized by the tissues and we have a secondary glycosuria. There is no standard of assimilation. It varies in different people and under different conditions. Although it is possible to demonstrate the presence of sugar in normal urine, it occurs in amounts too small to be detected by ordinary tests. It has been suggested that this urinary sugar may differ only in quantity from that found in the potential or real diabetic but it is believed by others (Folin and Berglund) that this glycuresis found in normal people may be a certain combination of carbohydrate materials which the body has found unfit for oxidation or storage and they consider its presence in the urine physiological.

Dr. Joslin says that out of three hundred cases of supposed nondiabetics coming to him for physical examination, a routine urinalysis showed sugar positive in fifty. Sugar was quantitative in but twenty-five of these cases and subsequent study showed definitely that only one out of the fifty was a frank diabetic. The severity of the disease may be gauged by the amount of sugar found in the urine but this does not indicate whether the condition is temporary or permanent.

INCIDENCE.

The incidence of glycosuria found in life insurance examinations has increased. It has been suggested that this may be caused by the increase in sugar consumed by the American people. That there has been little or no increase in per capita consumption of sugar between the years 1912 and 1921 is shown by the following table:

SUGAR CONSUMED.

(Weekly Statistical Sugar Trade Journal 1922)

Year	*Per Capita*
1912	81.3 lbs.
1913	85.4 "
1914	84.29 "

Year	*Per Capita*
1915	83.83 lbs.
1916	79.34 "
1917	78.58 "
1918	73.36 "
1919	85.43 "
1920	86.56 "
1921	84.47 "

I do not believe that the incidence of diabetes is increased by that cause. In my opinion the increase in the number of potential and true diabetics is more apparent than real. The constantly increasing number of individuals making application for life insurance and the emphasis now being placed upon the importance of periodic health examinations, have resulted in the more frequent finding of glycosuria. The incidence of diabetes in men and women is about equal. The slightly better mortality in men reflects the advantage of earlier diagnosis resulting from more frequent examinations. Women are less apt to seek medical attention until the condition is more advanced.

INFECTION.

Allen believes all diabetics have had a preceding infection of some sort which has damaged the Islands of Langerhans in the pancreas. The degree of severity of the disease is directly proportionate to the damage done.

The infections most frequently found in case histories are: infections of gall bladder, renal tract, pancreas, teeth and tonsils. Diabetes also follows syphilis and mumps.

Pancreatitis is more frequent than was formerly supposed. It may be primary in itself, secondary to the above infections or secondary to an acute infectious disease, often without subjective symptoms and not diagnosed.

Mitchell found that fifty-one out of one hundred sixteen cases of diabetes gave evidence of previous infection. Immediate evidence of the disease occurred in eight of these cases

while in the remaining forty-three the diagnosis of diabetes was not made for a considerable period after the date of infection.

The damage to islander cells results in impaired pancreatic function in proportion to the extent of the damage done. A dead islander cell never regenerates but if the case is mild and the infection is removed by treatment, operative or otherwise, an individual may attain a near normal expectancy if he continues to live within his carbohydrate tolerance. In such cases the undamaged islander cells are able to take care of enough carbohydrates to maintain life without undernutrition and the individual may remain fairly active in the business world. When living under such conditions the urine is usually free from sugar. To get these people to live within this tolerance is the big problem and is the reason such cases cannot be safely accepted for insurance.

OBESITY.

Fat people are usually large eaters. They consume a large amount of food of all kinds, throwing extra work on the pancreas. Statistics prove that the intake of glucose is somewhat proportionate to the weight of individuals and decreases with the decrease in weight. Some believe practically all overweight people are potential diabetics. It is true we find sugar in a greater number of overweight applicants for life insurance than we do in those who are standard or underweight. The continued overloading of the pancreatic function lessens tolerance and soon there is glycosuria. If found early enough the patient may limit his diet within the tolerance of the gland, reduce his weight, and may later become a ratable insurance risk.

Glycosuria in the obese usually occurs in the well-to-do patients and is more prevalent after the age of forty. Those who are more than twenty per cent over standard weight for height and age are more susceptible. In fact it is very seldom we find glycosuria in a person over fifty years of age whose weight is twenty per cent under standard.

In a series of 1063 patients studied in Joslin's Clinic, 40 per cent had marked obesity preceding the disease. A pre-

diabetic stage in obese people has been noted and Von Noorden with Joslin emphasizes the importance in such cases of frequent analysis for sugar. The severity of the disease as it appears in the obese seems to be inversely proportionate to the amount of excess weight.

HEREDITY.

The part played by heredity in diabetes has long been recognized. The offspring of diabetic parents seem to be more susceptible to the disease, their pancreatic function is limited, their carbohydrate tolerance is low and diabetes easily develops.

Allen and Mitchell applied glucose tolerance tests to relatives of people having diabetes and found the incidence high. Such tests are advocated for purposes of diagnosis and prophylaxis in the obese and persons of diabetic families. In Hoogslag's series of 250 cases the influence of heredity appeared in 43 per cent. Many of these showed infections of different kinds or obesity. One hundred thirty were men; one hundred twenty were women. Among the members of this group under age thirty the disease was usually fatal. The blood pressure was found to be low in the young and middle-aged patients and high in the obese cases and those which were complicated with arterio-sclerosis.

In one Clinic 1187 cases were studied and the influence of heredity was demonstrated in twenty-one per cent, in another

R. T. Williamson in "The Lancet," gives the result of the study of three series of case of diabetes in connection with family history.

(Kellog), twenty-five per cent.

1.	100 cases	13—13%
2.	300 cases	76—25%
3.	100 cases	23—23%
Total	500 cases	112—22.4%

It is interesting to note the different members of families affected. The following combinations were noted:

1. Two sisters, father, father's sister, father's father and grandfather.
2. A physician, his father, his father's mother and father's brothers' sons.
3. Father, mother and three sons.
4. A family of four—two brothers and two sisters. Two brothers and one sister were diabetic. They lived in different towns and the disease occurred at different periods.
5. Father and two sons.
6. Three sisters.
7. Three brothers.
8. Father, two sons and two daughters.
9. Two brothers, the father, and the father's mother.
10. There were many instances of a brother and a sister or two brothers and two sisters, etc.

In our selection a history of diabetes is one member of a family is ignored but when there are two or more members in the family who are diabetic or are proved to have low carbohydrate tolerance, an extra charge is indicated. Certainly the disability feature should be eliminated from all policies issued to those who have more than one case of diabetes in their family history.

OCCURRENCE OF GLYCOSURIA IN RELATION TO FOOD INTAKE.

Glycosuria occurs at unsuspected hours. We expect to find it from one to three hours after the intake of food but the slow absorption in some individuals and the more rapid in others, accounts for the variation in the time of its appearance. Securing the specimen at a definite time after the intake of food is an important factor and one upon which there is a wide difference of opinion. Some (Bouchardat and Kleen) favor securing the specimen one hour after the meal, while others (Seegan, Hamman and Macleod) favor the securing of the specimen two to three hours after the meal. A longer period is not practical from the standpoint of the insurance examiner

because it is difficult to secure the necessary co-operation on the part of the applicant, one or more specimens may be thrown away during the waiting period or the excretion of sugar may be so small as to be lost by dilution.

Horace Gray says that little or no evidence has been published to prove that persons with sugar in single specimens sufficient to be measured with Benedict's quantitative test, develop diabetes in the course of years but abundant proof is at hand to show that persons with trivial percentages of sugar discovered in single specimens at insurance or other routine examinations, who have continued to eat improperly, later came to the hospital because of diabetic complications.

The amount of sugar found in the urine depends upon the amount of carbohydrate in the preceding meal and on the permeability of the kidney. If the three meals of the day do not vary in carbohydrates, fats and proteins, sugar is more apt to be found after breakfast. However, breakfast is usually the light meal of the day. In fact certain Clinics arrange the diet so that breakfast contains about one-half the calories of the other meals. In a series of cases run by Külz and Rumpf it was proved that forty-nine per cent of the sugar excreted was within two hours after the intake of the sugar.

TWENTY-FOUR-HOUR SPECIMEN.

It is safe to say that if sugar is found in a twenty-four-hour specimen in quantitative amount, such person is a true diabetic, and is not insurable.

Many diabetics would not show quantitative tests of sugar in a twenty-four-hour specimen because some of them show sugar only at certain hours and the volume of urine dilutes the sugar until it cannot be found in quantitative amount. Twenty-four-hour specimens are therefore not reliable for life insurance work.

TEST MEALS.

Allen proved experimentally the relationship between the pancreas and the disease by removing a small portion of a dog's

pancreas. If carbohydrate diet was kept low, the dog appeared to be normal but if it was increased generously, he became diabetic.

The attempt to determine the seriousness of a history of sugar on one or more occasions in the past by giving a test meal of some sort, is common practice. A meal containing a considerable amount of carbohydrate, usually equaling more than one hundred grams, has been extensively used. Sugar is excreted perhaps more rapidly when glucose is given with meals and from this standpoint there is an advantage in giving a meal of this type. A chemically pure glucose given alone on a fasting stomach, is preferable and more practical to test the carbohydrate tolerance of an individual because it is an advantage to know the exact amount of carbohydrate which has been taken. Applicants for insurance do not like to give their time for special tests. Glucose can be given in the examiner's office or at the nearby soda fountain. It is unfortunate that we cannot have all of the applicants for insurance who take such a test, available to a laboratory or examined by one who is competent to determine the blood sugar. A specimen of blood may be safely shipped to a laboratory for blood sugar determination but the ordinary examiner for life insurance companies is not equipped to do this nor is he in possession of proper material.

We always obtain a blood sugar determination in suspected applicants when it is possible. There is always a sharp rise in blood sugar following the intake of a large amount of carbohydrates and if this rise remains more than three and one-half to four hours, we consider the individual to be diabetic.

It has been found impractical to ship blood specimens for the purpose of having blood sugar analysis. We must therefore depend upon the laboratory examination of urine following the test meal to determine whether or not the applicant is insurable.

A report by Barringer and Roper also shows the varied times at which the largest amount of sugar may be found following test meals.

Hours After Intake. (100 *grams sugar*)	*No. Cases*	*Per Cent Urine Sugar*
1 hr.	8	0.20
2 hrs.	9	0.25
3 hrs.	8	0.15
4 hrs.	10	0.14

We have found it practical to give one hundred grams of glucose to suspected individuals. This is sent to our examining physician with instructions as to how the dose is to be given and the specimens obtained. Specimens of urine are secured one hour and three hours after the glucose is taken. If sugar is found in either of these specimens we know that the individual has a low sugar tolerance and is very likely to become a diabetic, if he is not already one.

We do not believe anyone is insurable at standard rates who shows sugar in the urine after the intake of one hundred grams of glucose unless it is checked by blood sugar determinations, which is the only way we can definitely prove the diagnosis. Occasionally we see a case of renal diabetes which is little affected by the amount of carbohydrate taken. These cases are rare and because they are very liable to later become true diabetics, we do not consider them safely insurable. If acetone or diacetic acid is demonstrated in urine, postponement is indicated because we feel the applicant has probably been on a restricted carbohydrate diet.

No doubt we are declining many cases that should be accepted for insurance at some rate and accepting others which should be declined, but until the technic of securing and shipping blood for blood sugar determination is simplified to the point where the average physician can handle it, we know of no way to improve on our selection.

Until nineteen hundred twenty-two the treatment for diabetes was entirely along dietary lines. In that year Banting and Macleod were successful in separating the extract from the Islands of Langerhans and have been able to produce it in

therapeutic form. Insulin is a remedy which when administered to a diabetic along with proper diet, almost immediately reduces the blood sugar concentration to normal, clears the urine of sugar, acetone and diacetic acid, and relieves other symptoms of the disease. An Insulin treated person could pass any test for life insurance. What is to prevent those who are so treated from attempting to create an estate through life insurance channels? Who is to discover a reliable test for the urine to show that a person has been on insulin treatment? May not the clinical course of diabetes be so favorably influenced by insulin therapy that it will be possible to offer them some form of insurance protection? In view of the recent results of research workers we must be prepared to radically alter our present methods of underwriting applicants suffering from this disease who at this time are considered uninsurable.

DISCUSSION

Dr. Truitt—Mr. President and Members of the Medical Directors Association: At this time, I wish to express my appreciation of Dr. Huston's paper, and thank him for the excellent presentation of the subject under discussion which he has given.

In the Medico-Actuarial Mortality Investigation, Volume IV, Class 5, it appeared that the lives considered in that analysis were insured at standard rates. It is stated in that report that "the custom of the Companies was generally to decline cases with a history of sugar within two years of application unless there was proof that the glycosuria had passed away, or there was evidence of an error having been made in the original examination." The experience for all of the lives in this group showed a mortality of 103% of the expected. The greatest mortality occurred in the third policy year and amounted to 178% of the expected. The lowest mortality occurred in the fourth policy year and was only 45%. There were 17,454 lives considered in the group. This would appear to be a very fair exposure and one upon which a conclusion might safely be based if only cases to be accepted at standard rates were to be considered.

However, if insurance is to be given to diabetics and any considerable number of the group are to be benefited by it, a very much more liberal policy in selection must be exercised than was done in the group referred to.

The latest figures on diabetes which were obtainable from the Census Department, were those for 1920. I submit the figures for 1916, 17, 18, 19 and 20. In 1916, the total deaths in continental United States amounted to 1,001,921. Of these, 12,199 or 1.21% died with diabetes. In 1917, the total deaths were 1,066,711. Of these 12,734 or 1.19% were diabetics. In 1918, the total deaths were 1,445,158 and of these, 12,880 or .9% were diabetics. In 1919, the total deaths were 1,096,436. Of these 12,683 or 1.16% were diabetics. In 1920, the total deaths were 1,142,558 and of these, 14,062 or 1.23% were diabetics.

The great bulge in the general mortality in 1918 was due to the influenza epidemic, and this appears to have had little or no effect on the mortality of diabetics. From the foregoing figures, it would appear that the incidence of diabetes is not changing greatly. 1920 shows a very slight increase of diabetic deaths over those of the preceding years, but the change is so slight that it probably is of no great significance.

We might well give more serious consideration to infections as a cause for diabetes. There is no doubt that many otherwise unaccounted for cases of diabetes result from damage to the pancreas brought about by infection not directly involving that organ. It is a well known fact that infection of the gall bladder or of the bile tract frequently leads to pancreatitis through an ascending infection of the Wirsung duct.

Applicants at the younger ages giving a history of gall bladder infection with or without gall stones should be closely scrutinized as they may be in the so-called pre-diabetic stage. Severe chronic infection of the tonsils—and most of these cases are more severe than are generally recognized—very readily cause disturbance of the pancreas. So also may the other infections about the mouth and infections of the appendix.

Infection acute or chronic has a tendency to raise the thresh-

old of sugar tolerance. In the acute infections, this raise in the threshold is probably not long enough to cause serious damage; but in the chronic infections, such as have been referred to, the extra demand made on the pancreas over a long period of time may be very heavy, and may in many instances result in a final breakdown of the pancreatic function with the establishment of the condition known as diabetes.

By paying a little more attention to the rating of these infectious conditions, and directing the attention of the applicants suffering from them to the necessity of taking better care of themselves, we may avoid the development of the disease in a certain proportion of our policyholders who have been developing diabetes, and so reduce the mortality from this cause.

It is too soon to do more than guess at the influence Insulin treatment may have upon the expectancy of diabetics. As Dr. Huston has stated in his paper, the administration of Insulin in selected cases does cause the disappearance of sugar from the urine and brings the blood sugar down. In order to bring about this result, it is sometimes necessary to administer exceedingly large doses of Insulin; and in order to hold the ground gained, it is necessary to continue these large doses for an indefinite time.

This, of course, is in conjunction with dietary regulations. It is true that a person under Insulin treatment would be able to pass an A-1 Life Insurance examination so far as sugar is concerned. Even estimation of the blood sugar would be no protection to the companies, as Insulin reduces it to normal, and keeps the blood sugar at that point except in the event of some acute infection or gross excess in diet. But when we consider the enormous number of persons insured and the relatively insignificant number of persons who attempt to defraud an insurance company by misrepresentation, I think we may almost altogether disregard the danger of diabetics deliberately attempting to defraud the insurance companies by misrepresenting their true condition. Here and there one might be found who would attempt such a thing, but the aggregate of fraud from this cause, we believe, would be negligible.

On the other hand, we believe that the use of Insulin may make it possible to deal with diabetics on a more liberal basis than has heretofore been possible. In many other conditions, riders are drawn whereby the insured binds himself to do certain things. For instance, in the case of an applicant having a hernia, he may agree to wear a truss at all times and failure to fulfill his part of the agreement invalidates the insurance.

Could not such a rider be drawn to apply in the case of a diabetic, whereby he would agree to keep himself under the direction of a competent physician, and to use Insulin in sufficient quantities to insure his blood sugar remaining at or quite close to the normal concentration? The value of such a procedure and its application to life insurance cannot be known until a considerably longer period of observation has elapsed. We believe, however, that insurance companies should interest themselves in this direction and cooperate with the research men who are investigating the modern treatment of diabetes.

Before taking into account the use of Insulin in any given case, it should be definitely ascertained that the prospect is using Insulin manufactured by a firm operating under license from Dr. Banting. At the present time, there is only one such firm in the United States. A number of concerns are putting out preparations under the name of Insulin which are not the product described by Banting. Most of them are simply preparations of dried pancreatic gland and are absolutely of no value in the treatment of diabetes.

The practice of our Company has been in the past to accept only those cases which have not been under treatment or in which sugar has not appeared for a considerable time. The cases accepted by us, which have been few in number, have been taken at standard rates. It is our intention, however, to adopt a more liberal policy towards diabetics, and to accept those in whom the disease does not appear to be active with a rating ranging from 100 to 150%, following the general rules suggested in the paper of Dr. Rogers and Mr. Hunter presented at the meeting in 1921.

Dr. McCloud—In the discussion of this excellent paper I would call attention to and emphasize a few what seemed to me to be rather important factors.

Etiology. The etiology is obscure and undetermined owing to the lack of definite data, and generally regarded as an infection involving the pancreas possibly due to, primarily, a focal infection of one or several organs or tissues. Syphilis has been mentioned as an etiological factor. The literature is very definite as to this being a causative factor. In 79 cases of diabetes Smith found two had lues with heart lesions also luetic. Pinard in 23 diabetics found 11 with acquired syphilis, 5 hereditary. He believed that many of the complications of diabetes such as loss of reflexes, mal-perforans, neuritis, etc., are all manifestations of lues and places syphilitic etiology at 80 to 90%. Labbe finds syphilis as a cause of diabetes extremely rare. The coincidence of syphilis and diabetes is no more frequent than syphilis with other disease. In the literature only one case of diabetes appears to have been cured by anti-syphilitic treatment.

Insulin and Glycosuria. Dr. Huston has referred to the use of Insulin, or to use the trade name Illitin, in the treatment of this class of case. Probably no remedial measure since the introduction of salvarsan has attracted such wide attention as the discovery and employment of this substance. Enough preliminary work has already been done to convince the medical profession that this remedy will in time revolutionize the treatment of diabetes though, as pointed out by the author, only about 25% of these patients observed are entitled to the treatment as the other 75% usually respond to diet alone.

Insulin is not a cure. It is, as it were, a "Diabetic crutch" to support or to assist in the dietetic handling of the case. The relation which Insulin will bear to life insurance selection is to us a leading question and one which we will await the outcome of with interest. Many of these subjects are sure to elude us just as those applicants do and have done who have had salvarsan introduced into their veins. The patient of today

is so accustomed to baring the arm for hyperdermic or intravenous injections that little impression is registered to later remind him of this fact when examined for insurance and a certain number of this class are bound to get by us willy-nilly. The secret method of detecting these applicants is still unknown to us.

Quantitative Estimate of Sugar. The author has mentioned casually the quantitative estimate of sugar but has neglected to state the method used for making this determination. Formerly in our laboratory we used the fermentation test. In making an analysis of a number of cases showing sugar in appreciable amount by this test we found that entirely too large a percentage of our routine cases showed sugar in appreciable amounts by this test. We then set out to investigate and wondered whether the yeast which we were using might be responsible for our troubles, being of the opinion that possibly the yeast was fortified with sugar or other palatable substance to make it more agreeable for the consumer. This question was taken up with the biological chemist of the yeast company who wrote us that no adulteration of their product was practiced. We then experimented and found that we could get a reaction to their yeast whether we used urine, tap water or distilled water. The amount of gas fermented varied by a few bubbles up to 4/10 of 1% irrespective as to whether urine or water was used. The biological chemist intimated that our trouble lay in carrying out our experiments in an incubator at a temperature of 98 degrees. He advised us that we must use room temperature. At room temperature our results were practically the same in many instances.

I would here state that the leading books on chemistry which we have consulted recommend the tests being carried on in an incubator at blood heat.

We have discontinued fermentation test in our laboratory, believing it to be most unsatisfactory. For this we have substituted the Benedict titration test exclusively. I am fully aware that many of the companies are still using the yeast test and would appreciate an expression from some of the members who

are aptly qualified to advise whether their experience has been similar to our own.

Dr. Strathy—I am passing around a memorandum which I shall use as my text.

We feel that there are three main classes of glycosurics with which we deal—the diabetic, the renal glycosuric, and then the class which includes a lot of people who should not have sugar reported in their urines at all, and a lot of people about whom we cannot tell whether they are diabetics or renal glycosurics.

Like other companies we have therefore adopted the system of test meals. We believe our test meal is too strong to be perfect, but that is what we want. We want to throw out diabetics and a few others rather than let in diabetics who should not be there, so that if our test meal of 50 grammes of glucose on top of a meal is too strong, it is on the safe side, and that is where we want to be for the next few years. So that if we get negative meal tests we feel satisfied that we are keeping out the diabetics, with this exception, that in the case of foreigners we cannot always trust them, and if anyone is reported for a bad reputation plus a history of glycosuria, we won't take him. We feel that he can fool us if he wants to. There are Insulin and other methods, and in the last two years we found two foreigners who were fairly well-marked diabetics who did fool us, and we haven't yet found out how.

Now the renal glycosuric who has been thoroughly tested we look upon as not as bad as a diabetic, but he probably has some defect in his kidney, and we take those cases more cautiously, preferring to insure them on plans which mature at 55 years of age, or rating them for longer plans.

Then that brings us down to the more difficult class, the class with occasional sugar, and by our tests we think we can tell whether or not he is a diabetic when he has sugar in the urine from time to time. We are feeling a little safer about this class since these rules were drawn up. We feel that there are a great many people reported as diabetics who probably should not be. Dr. Benedict has shown that our tests are not satisfactory. In this class we hedge a little bit and as you see

we postpone them if we get sugar twice, and then if their sugar tolerance test is entirely clear we still put them at 120% which doesn't cost them an increased premium. If there is just a suspicion of sugar in their first sample or if it shows a trace of sugar we feel that they need a little higher rating because we do not think, gentlemen, that we have yet got quite to the sage where we can take blood sugar readings at their face value.

SUGAR

1. When found by Medical Examiner, remainder of specimen, preserved with boric acid, should be forwarded to Head Office whenever possible. If verified, and also in cases where there is an insurance history of Sugar, ask for another specimen, taken between one and two hours after heaviest meal.
2. If found again, postpone one year.
3. If not found and applicant is willing to proceed on the understanding that he may not receive a standard policy, a Sugar Tolerance Test is to be given, preferably glucose, 50 grams, after a meal (otherwise two consecutive heavy starch and sugar meals), the specimens to be collected one and four hours after the meal and glucose or after the second "starch and sugar" meal. Preserve the specimens with boric acid and forward to Head Office.
4. At the end of probationary period, if the postponed applicant is willing to proceed on the understanding that he may not receive standard insurance, and if a sample of urine is now free of sugar, a Sugar Tolerance Test is to be given as indicated in paragraph 3.
5. Blood Sugar Tests should be had wherever possible and reliable.
6. The Examiner should be instructed to catechise the applicant as to whether he is now or ever has been on restricted diet.
   (a) Rigid selection—older cases more favorable but watch for arterio sclerosis.
   (b) Provision for extra mortality in all but most favorable cases.

(c) Desirable to limit risks to small amounts of insurance.

7. If applicant "dieting"—reject.

PRACTICE

1. History of one attack over five years—disregard, if three ordinary tests (one of a specimen taken after the heaviest meal in the day) are clear.
2. Sugar found once on examination or history of one attack within five years—submit to Tolerance Test.
   (a) If clear—120% up.
   (b) If trace of Sugar found in one-hour sample, and free in four-hour sample, and if Blood Sugar Test satisfactory—125% up. If Blood Sugar Test not obtained —150% up.
   (c) If Sugar found in one-hour and four-hour samples—R. N. A.
3. History of two attacks within five years, last prior to one year—submit to Tolerance Test.
   (a) If clear—135% up.
   (b) If trace of Sugar found in one-hour sample and free in four-hour sample, and if the Blood Sugar Test satisfactory—150% up. If Blood Sugar Test not obtained —cannot recommend rating.
   (c) If Sugar in both samples—R. N. A.

Dr. Daley—Glycosuria occurs when the ability of the body to use or store away for further use the carbohydrates ingested or produced in the process of digestion is impaired.

According to the present day teaching, this impairment is due to the failure on the part of the pancreatic gland to produce a sufficient amount of a substance recently discovered by Banting called Insulin. The manner by which Insulin conserves the carbohydrates for the body's use is not known, nor is the pathological condition of the pancreas which causes its lack of function very well understood. Local symptoms do not occur, except those of an acute inflammation in acute pancreatitis, or the pressure of a tumor in cystic or neoplastic inva-

sion. To complicate matters further, determination of the cause of glycosuria is made more difficult by the fact that it may be produced by conditions such as shock, excessive consumption of carbohydrates, and abnormal conditions of organs other than the pancreas. As these various factors leading up to the reason for the occurrence of Glycosuria in any class of such cases are not well understood, the Medical Director has very little knowledge to guide him in assessing this condition. While he may know of a number of individual cases which have lived for years, he has not known the reason why they continue to live, while others with an apparently similar condition did not. He knows that a class showing CONSTANT GLYCOSURIA would give an excessive mortality, INTERMITTENT GLYCOSURIA also a mortality above his selection point, but probably eligible at extra rates in selected cases. ACCIDENTAL GLYCOSURIA, a mortality which borders between the above and his company's standard mortality. For life insurance purposes constant glycosuria therefore may be considered as disqualifying. The others may be considered. Unfortunately, for the Medical Director, the treatment of glycosuria must be understood and largely carried out by the individual himself. The degree of glycosuria is under his control and he may keep his urine sugar free during the period of time over which an examination for life insurance may extend. It is our experience in cases with a sugar history that the third or fourth specimen is more apt to contain sugar.

The Equitable Life Assurance Society of the United States has in the past

A—insured applicants with a history of glycosuria not found on examination.

B—applicants with or without such a history where sugar is found on examination. It endeavors to assure itself that individuals in these classes are not on a diet, have no other symptoms of diabetis and are otherwise acceptable risks.

A goodly number in Class A are accepted at regular rates. The remainder and those in Class B are insured according to the following tentative table, which I wish to emphasize is

tentative only, and not sufficiently based on experience to warrant its accuracy:

PROVISIONAL SUGAR RATINGS—JULY, 1922

Accidental.....1 out of 4 or more
Occasional, including all M. I. B. within 3 years.....1 out of 3 (if M or L get 4th)
2 out of 6
Intermittent, including all M. I. B. within 3 years.....2 out of 4
2 out of 5
3 out of 6
Constant, including all M. I. B. within 3 years.....2 out of 3
3 out of 4
3 out of 5
4 out of 5
4 out of 6

Average the % of Sugar as we average the Blood Pressure

	Less than 0.3%	% ("N") 0.3 to 0.45	% ("M") 0.5 to 0.95	% ("L") 1.0 to 1.50	% over 1.50
Accidental.....	0	+15 to 0	+20 to 0	+25 to 0	+30 to 0
Occasional.....	0	+25 or +30	+40	+50	+70 up
Intermittent....	+25	+40 up	+90	+150	D
Constant.....	+30	+50 to +75	+100 to +150	D	D

These ratings do not include the presence of acetone or history of diet or treatment, and specimens of good specific gravity voided in the afternoon at least two hours after eating are only to be considered.

In selecting these cases as a rule, three after-meal specimens are obtained, with an endeavor that at least one shall be taken after a test meal, properly witnessed. In some cases this is insisted on. As far as possible we like to have an interval of at least six days between the specimens. The laboratory, using Haines Solution, checks its results in every instance by the Phenyl Hydrazine test, examining also for acetone and diacetic acid. A titration method using an ammoniated copper solution, developed by our Chemist, Mr. A. S. Wolf, is used for quantitative purposes.

A few years ago a small class of cases belonging in Class A and accepted standard by the E. L. A. S. was investigated. Its mortality corresponded closely with the Society's general mortality, but the class was so small that its results were not convincing.

The Society's experience with those cases accepted at extra rates is as follows:

	En-trants	Expected Loss	Actual Loss	Total Mor-tality	Grippe and War Excluded
Sugar.....	370	8.819	14	159%	154%
Sugar and other im-pairments.....	298	6.247	10	160%	144%

This class is also too small.

Of the sugars other than glucose that may be found in urine, Pentose is the most common. These cases are treated more leniently.

RENAL GLYCOSURIA—These cases are so rare and so liable to be confused with constant glycosuria that they are not accepted.

INSULIN—From a life insurance point of view, we do not know anything about it as yet. Undoubtedly, it will prolong the lives of certain diabetic policyholders. It will also help unscrupulous applicants to obtain policies to which they are not entitled. So at present its benefit from a life insurance point of view is somewhat questionable, but it undoubtedly is a benefit.

For the sake of brevity I have not gone further in discussing Dr. Huston's excellent paper. There are so many phases in the selection of these cases that it is impossible to cover them in a discussion of any ordinary length. The extensive investigations now going on as a result of the Insulin treatment, as well as newer laboratory methods for sugar testing may produce some diagnostic method by which we may be able to assess the impairment more accurately.

Dr. Exton—There is a point connected with the test meal which is of practical importance. See to it that the person

empties the bladder just before taking the test meal; otherwise the urine passed after the meal will be diluted by the starvation urine and the sugar so diluted that you may not find it. Also, be sure to get your specimen within the first two hours.

With reference to insulin, there is no chemical test for it; there is a physiological test which is quite impractical for life insurance purposes. You may remember that last year I told you about a nitrogen-sugar ratio which we had been experimenting with. Strangely enough, it was possible to spot two cases which were taking insulin by means of this ratio. Just as a matter of interest, it might be possible to find this ratio useful in this particular. It is, of course, an indirect method, which depends upon the practical impossibility to so grade the dose of insulin that the patient will be able to show a normal ratio. We know by experiment what a normal ratio is, and if the ratio is higher than normal, that it is probably due to diabetes; but when the ratio is found to be a good deal lower than the normal, it is apt to denote the use of insulin on account of the rarity of other conditions which will depress the sugar below normal.

Dr. Muhlberg—I wonder if the laboratory men would not be interested in some work that we have been doing with reference to insulin. I think we are all interested in these cases where there is a possibility of a patient's taking insulin in order to avoid sugar being found in his urine, particularly in passing the glucose test. Insulin prepared by Lilly is preserved with cresol, and it occurred to me that if we examined the urine for cresol we could catch some of the insulin cases, so I procured twelve insulin samples and we tested them for cresol. Unfortunately cresol appears in the normal urine as the result of the protein katabolism in the body. I thought therefore we had better check it up and examine some normal samples. I found that 3% of them gave a positive cresol reaction. Unfortunately I was able to get only twelve insulin samples, and 50% of them gave a positive cresol reaction. I would be a little inclined to look with suspicion on any person with a sugar history whose sample gave this cresol test. I merely

suggest this because some of the laboratory men know more about chemistry than I do. In speaking of the matter with Dr. Benedict he said it might be a good idea to get the insurance companies to ask the Lilly people to put some preservative in the insulin, that could be unmistakably detected.

Dr. Brown—Dr. Patton and I have recently studied a small group, and we would like to take this opportunity to get this evidence into the records. This is a class of applicants who have previously had sugar in the urine, but their urine at the time of acceptance was normal. Some of these risks were taken ten years ago, and probably very few of the specimens came to our Home Office.

In the group there was a total of 2,056 cases. There are existing now in the group 1,723. We have had 37 deaths. The mortality experience was 87%. The worst age groups were 35-44.

We have also tabulated the 37 deaths. Three of the individuals died of Diabetes.

MORTALITY STUDY OF RISKS PREVIOUSLY HAVING SUGAR IN URINE

URINE NORMAL AT TIME OF ACCEPTANCE

ISSUE OF 1912 TO APRIL 30, 1922—INSURANCE YEARS 1 TO 10, INCLUSIVE

Ages at Entry	Existing May, 1923	Withdrawn	Died	Total	Exposed to Risk	Expected Deaths A. M. Table	Ratio % Actual to Expected
15–19	46	7	1	54	169	.57	175
20–24	170	51	1	222	835	3.12	32
25–29	303	65	4	372	1389	5.35	75
30–34	356	69	5	430	1581	6.48	77
35–39	315	43	8	366	1302	6.26	128
40–44	230	26	8	264	931	5.89	136
45–49	177	22	5	204	743	6.65	75
50–54	83	9	3	95	363	4.86	62
55–59	33	4	2	39	119	2.26	89
60 & over	10	—	—	10	31	.87	—
Total...	1723	296	37	2056	7463	42.31	87

POLICY CANCELLATIONS BY DEATH

Age Entry	Duration	Cause of Death
15	1	Append.
23	2	Inf.—Pneu.
25	2	Acc.—Aeroplane
27	3	Diab. Mel.
29	2	Diab. Mel.
29	1	Inf.—Pneu.
30	2	Inf.—Pneu.
32	3	Inf.—Pneu.
34	2	Cer. Sp. Mening.
34	2	Append.
34	2	Lobar Pneu.
35	3	Lobar Pneu.
36	2	Carc. Colon
37	2	Carc. Colon
38	8	Bronchopneumonia
38	3	Acc.—Acetylene Gas
38	3	Ac. V. D. Ht. (Coroner's Case)
38	2	Otitis Media
38	2	Scc. Burned
40	3	Acc. Run over by cart
41	2	Acc. Run over by cart
40	3	Diab. Mel.
40	5	Apop.
40	10	Ch. Int. Neph.
42	2	Ch. V. D. Ht.
42	2	Suic. Hanging—Meniere's Dis.
44	2	Suic.—Cut Throat
45	3	Pleuropneumonia
45	3	Carc. Stomach
46	3	Carc. Pharynx
48	1	Lobar Pneu.
49	1	Ch. Neph.
50	2	Cancer Liver
50	1	St. Hernia—Myocard.
51	3	Tuberc. Enteritis
59	1	Duodenal Ulcer
59	7	Carc. Liver

Dr. Huston (closing the discussion)—Mr. President: I am very grateful to all of these men for their discussion of this paper.

Dr. Truitt's statement that there had not been much change in the mortality of diabetics is contrary to the report made by Dr. Joslin two years ago when he showed that there was a slight improvement in the mortality but a higher incidence of

glycosuria found, probably due to health and insurance examinations.

Dr. McCloud spoke of the fermentation test. We use this test and it should always be run with a control. If there are a few bubbles on the control, there is something wrong with the yeast, which should be tested out.

I think the proposition of test meals is most important. We use one hundred grams of glucose in this meal. We know that it does not take one hundred grams of glucose to throw down sugar in a free diabetic. I believe it was in Rochester, they tested this out thoroughly and found that by pumping stomachs two hours after taking one hundred grams of glucose, they were able to obtain a certain proportion of the dose given. Sometimes, too, the applicant is not able to hold all of the dose. We know that these are disadvantages but there are also some distinct advantages. The advantage is that we know the applicant has taken a certain amount of glucose. We know that we give them one hundred grams but whether they absorb it or not is a different thing. Of those who give a positive glycosuria following the test meal we find a higher per cent. is positive in the first hour than in the third hour following the meal.

We believe that Dr. Strathy's idea of giving an ordinary meal plus the glucose is a very good one if we could get our applicants to take it. As Medical Directors we are not only responsible for the mortality of our companies but it is our duty to keep the agency force lined up and pleased and at the same time get these tests over. From a practical standpoint we have found it better to give a glucose meal rather than the combination of the two. We must not forget that it is important to handle these matters in a way that does not discourage the person who is buying the product which we have to sell.

The man who gives a history of glycosuria upon one occasion some years ago and is not overweight, I believe is a standard risk. The occasional glycosuric, the fellow who shows sugar upon examination today and does not show it upon a second examination, is hard to classify. We check all of these

that we can with blood sugar determinations. I do not know how to classify these people when they have five-tenths or five per cent. sugar today if we do not know how much carbohydrates they had yesterday or this morning. If we can check these people with blood sugar tests the classification is not difficult. The rise of the blood sugar and the duration of time which it stays above normal is the important diagnostic point. Certainly anybody who shows sugar constantly is not insurable. The occasional glycosuric who has a low carbohydrate tolerance is probably insurable at an extra rate and that to us would mean over one hundred seventy-five (175) per cent.

Dr. Exton spoke of being sure that the bladder is empty. This is the first point given in our instructions to an examiner. We ask him to see that the bladder is empty before the glucose is given and we test that first specimen to find out whether it showed sugar. The glucose test meal should always be given after twelve or more hours of fasting.

I do not believe insulin is going to affect our selection but it is going to benefit insurance companies by giving us a few extra premiums from those who are already on our books and have since developed diabetes. This is the most important part it has to play in the insurance business.

AFTERNOON SESSION

Dr. Porter—Mr. President and Gentlemen of the Association: For the past five years the editing of our "Proceedings" has been conducted in the most efficient manner by Dr. Daley. He has had a stupendous amount of work, and he has handled it in a magnificent way, and I think before we proceed with the afternoon session, we should have an expression of appreciation to Dr. Daley for this work. I move therefore that a vote of appreciation and thanks be extended to Dr. Daley for the admirable way in which he has conducted his duties as Editor of the Proceedings.

Dr. Hobbs seconded the motion and it was carried unanimously.

Dr. Grosvenor—Dr. Frost of the New England Mutual Life Insurance Company, will now present a further report on the progress of the work which he described here last year connected with the application of the Cardio-Respiratory Test.

REPORT ON PROGRESS OF THE APPLICATION OF THE CARDIO-RESPIRATORY TEST

HAROLD M. FROST, M.D., Boston, Mass.

Home Office Examiner

New England Mutual Life Insurance Co.

A detailed description of the cardio-respiratory test was given in the paper presented before this Association one year ago. At that time our efforts had been directed mainly to determining the normal reaction to the test. Since then, we have been applying it to applicants in whom some cardio-vascular impairment was found, suspected, or to be ruled out.

This report covers the application of the test to the first 300 applicants during the period from January, 1922, to July, 1923. There were 296 males and 4 females. The majority of them, 276 in number, were examined during the 10 months from October, 1922, to July, 1923. The work was done mainly at the Home Office by six examiners, upon a total of 255 appli-

cants. In October, 1922, it was extended to the New York agencies, and 45 tests have been made in that city.

Of these 300 applicants, the monthly number and percentage of examinations, and the monthly percentage of acceptances, are given in the following table. Of the total, 170 applicants were accepted, or 56.6%.

TABLE I

1922	Number Examined	Percentage Examined	Percentage Accepted
January	3	1.0	66.6
February	4	1.4	50.0
March	9	3.0	66.6
April	1	0.3	100.0
May	1	0.3	100.0
June	2	0.7	50.0
July	3	1.0	33.4
August	0	0.0	0.0
September	1	0.3	0.0
October	10	3.4	33.4
November	21	7.0	47.6
December	33	11.0	57.5
1923			
January	19	6.3	52.6
February	31	10.4	41.9
March	39	13.0	28.2
April	36	12.0	30.5
May	28	9.3	50.0
June	42	14.0	50.0
July	17	5.6	47.1

To the 170 accepted applicants, insurance was issued to the amount of $1,377,500. It was divided as follows:

TABLE II

Form of Policy	Number of Policies	Amount Issued
Ordinary Life	62	$666,000
Five Year Term (non-ren., non-conv.)	23	193,000
Twenty-Payment Life	21	142,500
Twenty-Year Endowment	24	75,000
Other modified forms	40	301,000

In 268 cases the test was applied on account of cardio-vascular impairments; in the remaining 32, for miscellaneous reasons, such as over-weight, a history of glycosuria, low systolic pressure, under-weight, etc. Table 3 shows the number of the various impairments with the percentage of each accepted.

TABLE III

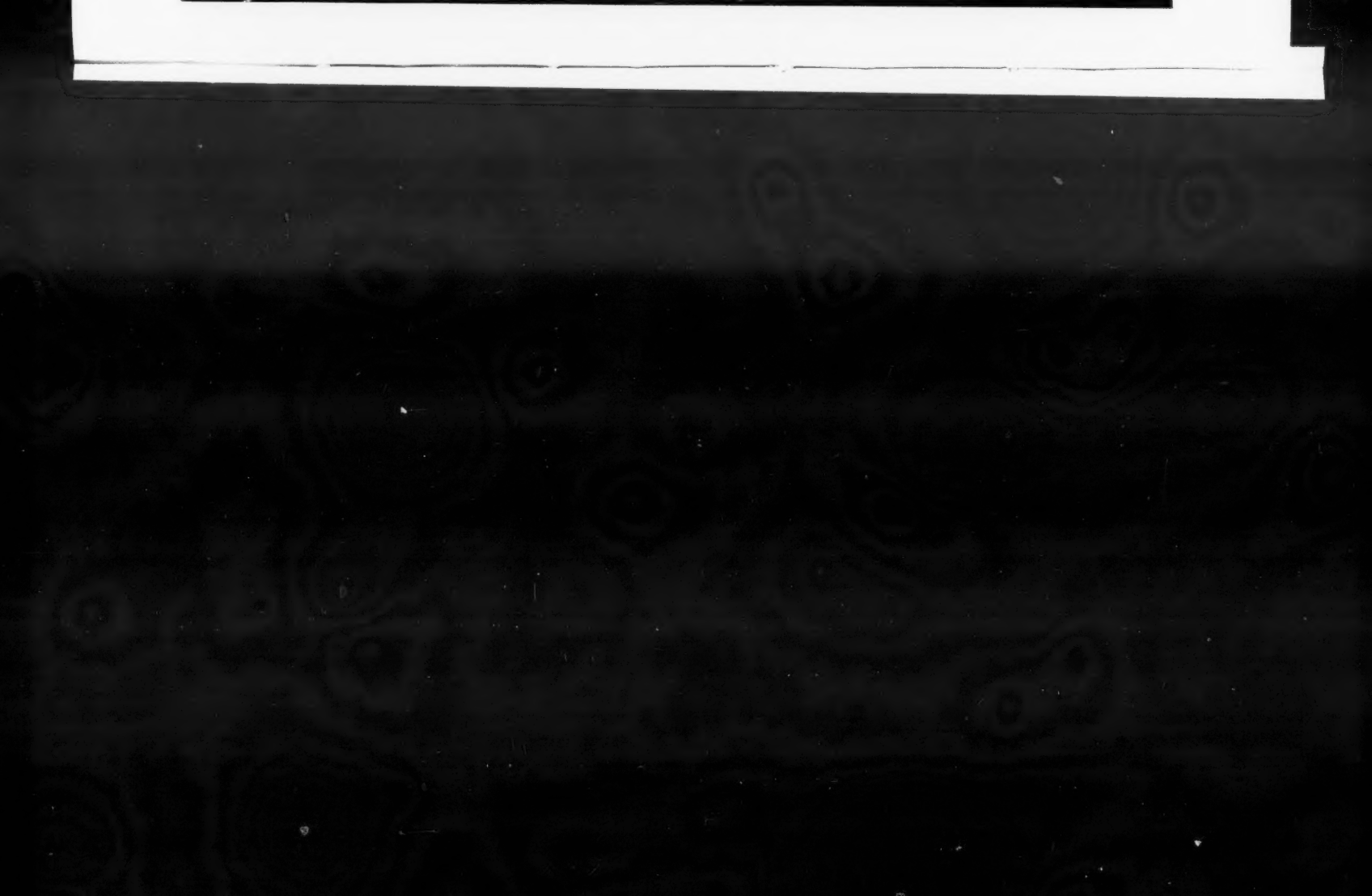
Impairment	Number	Rejected	Accepted	Percentage
Heart murmur	223	106	117	52.5
Hypertension (over 150 mm.)	20	13	7	35.0
Tachycardia	10	5	5	50.0
Irregularity	7	1	6	88.8
Hypertrophy	6	3	3	50.0
Goitre	2	0	2	100.0
Miscellaneous	32	2	30	93.8

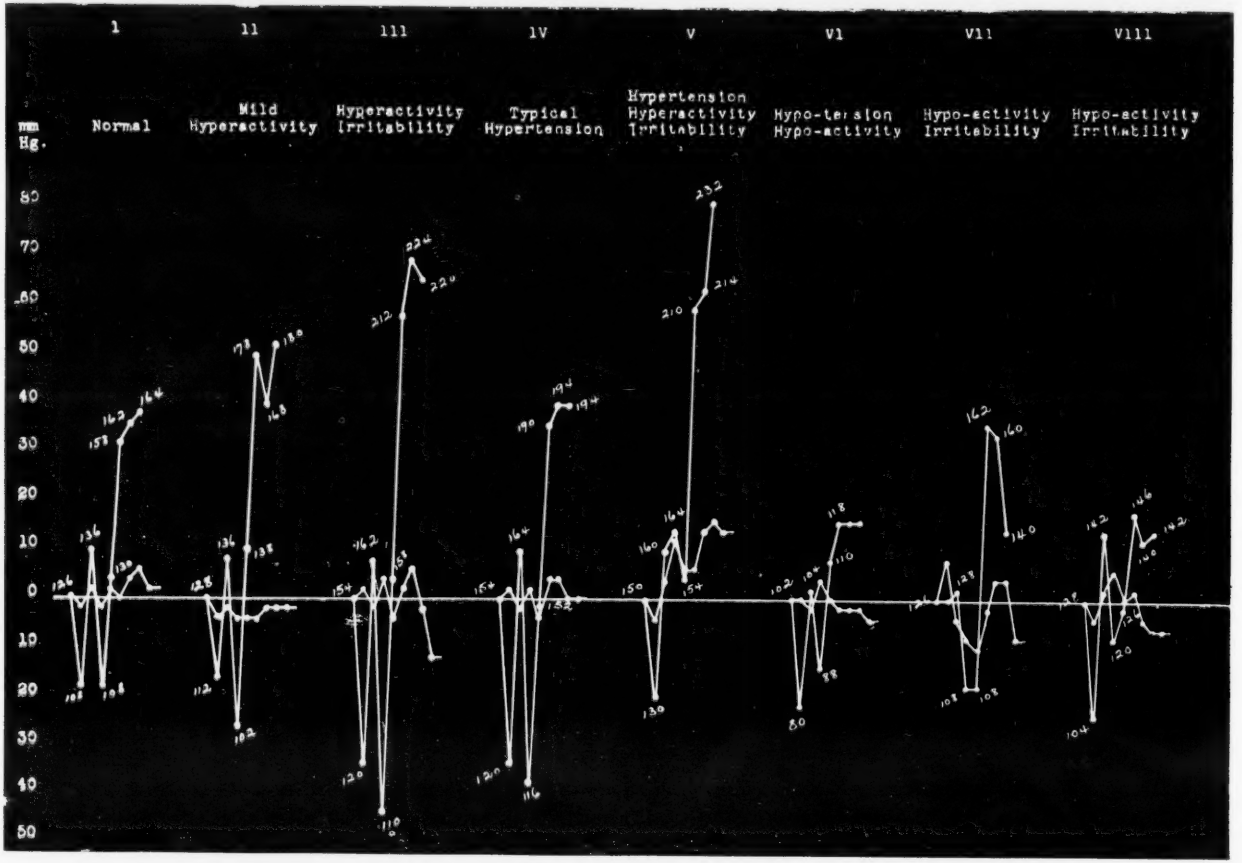
Of the 106 rejected with heart murmur, 78 were rejected on account of an abnormal reaction to the test, while 28 with a normal reaction were declined for other reasons. Of the total of 130 rejections, there were 102 with abnormal reactions which were directly responsible for the rejections.

The heart murmurs were located as follows:

TABLE IV

	Number	Number Accepted
Pulmonic systolic	64	44
Apical systolic	43	21
Generalized systolic, loudest at left base	34	18
Basal systolic	27	18
Generalized systolic	18	8
Multiple murmurs	17	0
Generalized systolic, loudest at apex	7	1
Generalized systolic, loudest at base	5	2
Systolic at right base	4	4
Diastolic over sternum	3	1
Generalized systolic, loudest at right base	1	0
	223	117




1
11
111
1V
V
V1
V11
V111
mm Hg.
Normal
Mild Hyperactivity
Hyperactivity Irritability
Typical Hypertension
Hypertension Hyperactivity Irritability
Hypo-tension Hypo-activity
Hypo-activity Irritability
Hypo-activity Irritability
80
70
60
50
40
30
20
10
0
10
20
30
40
50

The following table gives the various impairments found at examination:

TABLE V

	Number	Accepted	Percent Accepted
Albumin	10	0	0
Casts	4	0	0
Extra-systole	20	9	45.0
Glycosuria	9	0	0
Goitre	7	3	42.8
Hypertension	55	13	23.6
Hypertrophy	48	6	12.5
Irritability	17	5	29.4
Murmurs	223	117	52.5
Overweight (25%+)	9	6	66.6
Tachycardia	47	19	40.4

The accompanying chart gives a series of the reactions which we consider abnormal. Curve I is the average normal to be used for comparison.

Curve II gives the reaction of a man of forty-one years with a systolic murmur at the base. The reaction pressure in Steps 6 to 8 is somewhat greater than normal, indicative of a mild degree of hyperactivity. The base line is steady, indicating the absence of irritability.

Curve III gives the reaction of a boy of nineteen years, with a slight enlargement of the heart, a generalized systolic murmur loudest at the left base, a pulse rate of 96, and hypertension. The excessive response of the heart in Steps 6 to 8, together with the irregular base line and rapid pulse rate are typical of the reaction of an irritable, over-acting heart.

Curve IV gives the reaction of a man of forty years, with slight enlargement of the heart, a generalized systolic murmur, hypertension, and a pulse rate of 88. The Curve itself represents a typical hypertension reaction. The significant features are that the pulse pressure decreased 12 mm. during the test, and the pulse rate increased to 100 per minute. We consider this an evidence of myocardial weakness.

Curve V gives the reaction of a man fifty-two years, who had a slightly enlarged heart with no murmurs, a border-line hypertension, a diastolic pressure of 100 mm., and a pulse rate of 84. This Curve, as compared with Curve III, the typical hypertension, demonstrates a hypertension with excessive reaction to strain, and an excessive variation of the base line. The pulse rate increased to 96. It is a reaction of hypertension, hyperactivity, and irritability.

Curve VI gives the reaction of a man of thirty-eight years, with a low systolic blood pressure and no other impairment. The reaction, while giving no indication of irritability, does indicate a lack of vigor.

Curve VII gives the reaction of a man of forty-four years, without any particular impairment, whose general appearance was unsatisfactory. The Curve is atypical, showing a fall of reaction pressure in Steps 6 to 8, with an irregular falling base line. Pulse pressure decreased 18 mm., while the pulse rate increased slightly. This probably indicates either a decrease of power under strain or the intervention of vasomotor relaxation.

Curve VIII gives the reaction of a man of twenty-five years, who presented an apparently functional systolic murmur at the left base, a pulse rate of 88. During the test the pulse pressure decreased 14 mm., while the pulse rate increased. The significant features of the Curve are the irregular base line, and the insufficient increase of reaction pressure in Steps 6 to 8. This heart is apparently irritable and does not react to strain with the necessary vigor.

The technique of the test has been changed in a few minor details. We are now using, instead of the steam gauge described in the first paper, a compound gauge manufactured for us by the Taylor Instrument Company of Rochester, New York. It is small, quite stable, and has proved more satisfactory than the steam gauge. It registers positive and negative pressure in centimeters of mercury.

Steps 2 and 3 have not been changed. In Step 4, the subject is required to maintain a positive pressure of 40 mm. Hg. instead of one pound; likewise, in Step 5, a negative pressure of

25 mm. Hg. instead of one-half pound. These pressures are maintained for a sufficient length of time to determine whether or not the subject is able to hold his breath over a normal period.

In Steps 6, 7, and 8, we now require the subject to blow in each Step to his full capacity at a constant pressure of 20 mm. Hg. as long as he is able to do so. We thus obtain a uniform rate of expiration. The pressures used and the capacities blown are noted on his chart, so that at future examinations the test may be administered under approximately the same conditions.

We are insisting upon careful attention to the character of the pulse during the test and to the reaction of the systolic pressure after each Step is completed. The examiner readily learns to distinguish the irritable heart by the rapid accelerations of pulse rate and undue rebound of the systolic pressure after it has been depressed in Steps 2 and 4. It is normal for the systolic pressure to rise from 10 to 20 mm. Hg. above the base line in these Steps after the intra-pulmonary pressure has been released.* Any increase greater than this apparently indicates irritability.

In two cases there has occurred an apparent temporary heart block. In each case the pulse abruptly decreased to one-half its former rate, remaining so for about one-half minute, quickly resuming its natural rhythm, without subjective symptoms. Except for the cases reported in the previous paper, no untoward symptoms have been elicited. We are especially careful, particularly in the older subjects, not to force the systolic pressure above 230 mm.

Up to the present, there have been no deaths among the cases accepted, and, as far as we know, none among those declined. During the month of August, instruction in the technique was given to the Chief Examiners of our General Agencies in Buffalo, Cleveland, Detroit, Chicago, Milwaukee, Minneapolis, St. Louis, Indianapolis, Louisville, Cincinnati, and Philadelphia. In the near future it will be extended to additional agencies.

Our confidence in this test is gradually increasing. We feel that we have an easily applied method for determining

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whether the heart responds to strain with a natural outlay of power, or whether it reacts weakly, too forcefully, or erratically. It is not difficult to master, is not objectionable to the subject. While we do not yet claim for it definite diagnostic or prognostic value, we believe it offers considerable assistance in estimating the present functional power of the cardio-vascular system, and places at our disposal an additional check in doubtful cases.

DISCUSSION

Dr. Grosvenor—Dr. Chapin will open the discussion of this paper.

Dr. L. D. Chapin—Mr. President and Gentlemen of the Association: Ever since I heard Dr. Frost present his paper at our meeting a year ago, I have been eagerly awaiting reports on the practical application of his test in medical selection. As no galley proofs of the present report were sent out, I have only just heard of his further experience with cardio-vascular reactions to variations of intra-thoracic pressure. It seemed to me as I heard him describe his test last year that the last three steps (six, seven and eight) would be especially likely to be of practical value, a terminal fall in pressure appearing to be fairly constant in the few cases with cardio-vascular impairment which he reported. The results which he reported today seem at first sight to bear this out. I have not had a chance to examine them closely.

One question occurred to me in regard to heart murmurs. I understand Dr. Frost to say that 223 cases with heart murmur were tested. I should like to ask if those cases included both organic and so-called functional heart murmurs. If I understood him correctly Curve VIII represented a case of functional murmur.

I also remember that Dr. Dwight spoke last year of possible danger in this test, and he advised all of those present who thought they had any cardiovascular trouble not to try it, and I was wondering if it was the custom of Dr. Frost to ask the applicant beforehand about this, or to tell him there might be some danger in the test.

On the whole it looks as if Dr. Dwight and Dr. Frost had given us a functional cardio-vascular test which, like Dr. Dwight's kidney test, "works". The Company which I represent will watch with much interest their future experience with it.

Dr. Grosvenor—Has Dr. Rowley anything to say on this subject?

Dr. Rowley—Mr. President and Gentlemen: I am surprised to learn that our good President has not heeded my request not to be called upon to take part in this discussion, for I feel that one who has not had experience with this work is not in position to discuss the scientific features of it. It is hardly discussable from that standpoint. I am glad, however, to take this opportunity to express what was expressed last year, and what I am sure is the mind of each one of us here, our sense of gratitude from the standpoint of the individual and from the standpoint of this Association to Dr. Dwight and to Dr. Frost for this splendid work which seems likely to be of so much value to us in selecting risks from a group in which it is now most difficult to select those who are fitted and those who are unfitted. I am very much interested in this and shall be glad to watch its future growth and development.

Dr. Blakely—Mr. President and Gentlemen: May I say just a word supplementing what Dr. Frost has said about this chart? Remember that no one chart will show everything we would like to have it show. Note also that each of the separate curves begins at the same point whatever the initial blood pressure.

It has seemed to me that with the prevalence of circulatory impairments among our applicants and with the great number, the increasing number of deaths from circulatory diseases among our policyholders, there is a perpetual challenge to us to try to improve our methods of selection in these troublesome groups. The same conditions of course are a perpetual challenge to the clinician, to improve the treatment of circulatory diseases, also to make early diagnosis, to recognize the earliest signs of circulatory disorder, and, to go back a step further, to try to educate the public to live and work under conditions

that will prevent the development of some of the circulatory disorders that we believe are due to strain, overwork and improper methods of living.

In general the most troublesome problems of medical selection are in the border-line cases, as we call them. We know how difficult it is in the group of circulatory impairments to get unanimity of opinion. We may have four or five men examine one applicant and get four or five different opinions as to the interpretation of what is seen, felt and heard. But even when everybody agrees, there is still a troublesome group of border-line cases. The heart is irregular, the heart is rapid, there is a questionable enlargement, the man was prominent in athletics and has what we call an athletic heart but "otherwise is a perfect risk," there is a little murmur heard at one point only or a part of the time only, some call it a functional murmur, others a doubtful murmur. And when we remember that the best clinicians tell us that the same sound is produced in unimportant and negligible conditions or under conditions which are temporary, and also in the beginning of what is really one of the most serious form of circulatory failure, myocardial degeneration, then we realize that we have difficult problems to meet, and if we can get an additional test to those that we already have, it seems worth while. We all know that our grandfathers got along very well without the clinical thermometer, they made fairly accurate diagnoses, and gave fairly satisfactory treatment. Our fathers got on very well without the sphygmomanometer. We all remember when it first began to be used in life insurance work. None of us would think of smashing the thermometer or throwing away the sphygmomanometer. We want all the help we can get. Dr. Frost has given us a test which seems to be simple, easily applied, and of assistance both when it is first used, and for comparison later. We have had the opportunity of re-examining a few of the men who have been accepted or declined and we hope to continue to re-examine them from time to time and learn all that we can about the test. Whatever gives us additional confidence in the border-line cases is worth while.

Dr. Chapin raises one question about the quality of heart murmurs. Dr. Frost will answer, I presume, but I feel sure that I am right in saying that all of the so-called functional murmurs have been included. I do not believe we can distinguish between a functional murmur and an organic murmur except by awaiting the development of time. I do not believe that on one examination any man can tell whether a murmur is temporary or permanent.

Another thing I like about this test is that the results seem to be consistent with all other tests we know, and we try to interpret the findings with common sense. We are not relying upon it solely. When the evidence in a case is about evenly divided this sometimes helps us to accept and sometimes to decline. We are rather glad that the numbers accepted and declined are nearly equal. I think the actual figures were that 56% have been accepted and 44% declined. We feel much better than if we found we were able to accept only 10 or 15%, or that by this test the indications were that we could safely accept 85 or 90%.

We consider this a report of progress and we hope that this year and next year and the year after we shall be able to add something to the experience we have had.

Dr. Archibald—There are two questions which I should like to ask Dr. Frost: The first is—when he finds a case which is distinctly abnormal as shown by his test, are the results checked up by other physical methods? For example, take the man from whom curve 8 was obtained; were the results of the test made, checked by other examinations in order to see whether the heart was normal?

The second question: In curves 2 to 9 varying abnormalities are shown. There are, apparently different types of curves. I should like to know whether in specific cases, that is to say, in a group of cases with hearts similar to the individual who gave curve 2, would the characteristics of curve 2 always be found? In the same way in curve 8, provided the applicants were showing the same abnormalities, would similar curves be found, or is any abnormal type of curve liable to occur?

Dr. Frost (closing)—I wish first to express my thanks particularly to Doctor Chapin and Dr. Rowley for discussing this paper. I certainly appreciate that it is a mighty poor paper for anybody to discuss unless he knows something about it. Dr. Blakely knows something about it, and I wish to express my thanks to him, for that reason.

Regarding Dr. Chapin's observation that the three final steps are the more important in relation to the base line, he is perfectly correct. We are placing more importance on the reaction of the pressure in these steps and upon the steadiness of the base line than we are on the reaction in the other steps, with the exception possibly of Step 3 in which, as I have already said, an abnormal rebound in the systolic pressure may mean irritability. We have some reason to believe, although I am not yet prepared to make a definite statement, that in cases showing sclerosis of the arteries we get a diminished amplitude in the fall of the pressure in Steps 3 and 4. We have not had enough observation of that problem yet to make any definite statements.

As regards types of heart murmurs, the 223 cases which are quoted, include all murmurs whether functional or organic.

Dr. Chapin is perfectly right as regards Chart 8. This was an individual who showed a slight murmur in the pulmonic area which was presumed to be functional in type and therefore of no importance. He gave a distinctly abnormal reaction and therefore could not be accepted according to our standards.

As regards the possibility of the test damaging the subject, naturally I do not inform the subject beforehand that if he goes through it he is apt to have a stroke of apoplexy! I am afraid we should not be able to carry it out if we gave such warnings! We use our common sense. Our present rule is not to apply the test to any individual who has a systolic pressure of 170 mgs. or over. We have occasionally applied it to individuals with higher pressures, but only when they were comparatively young, and it seemed probable that they would suffer no injury from a systolic pressure of 240 or 250 or more. It is quite possible that if you took an elderly subject with a systolic pres-

sure of 170 or 180 and applied the test, pushing his systolic pressure up possibly to 250 mms. it could cause a cerebral hemorrhage.

Replying to Dr. Archibald's questions, first, as regards Curve A, as I understood him he asked if all individuals showing the same physical signs give this type of curve.

Dr. Archibald—Not quite. What I meant to ask was that when you have a homogeneous group with the same physical signs—take a lot of people with the signs of the man who gave Curve 2 for example, would you get Curve 2 in every case? If the physical signs were homogeneous, would the curve be homogeneous?

Dr. Frost—Not at all. One individual in this group is a man with a functional heart murmur. The chances are that a very great proportion of that type of individual would give a normal reaction; though I cannot say so definitely. We probably expected a normal reaction in this individual and we obtained an abnormal reaction, which led us to believe that there was something underlying the slight cardiac signs, something more than a mere functional murmur, that probably there had been already some definite degeneration in his cardio-vascular system.

With reference to Dr. Archibald's other question, I would say that it is our custom at the Home Office to check up with one of the ordinary exercise tests. One examiner uses the hopping test, another will put a man down on the back and lift him a certain number of times, varying it according to his apparent vigor, and the results tally in the main. We haven't made any careful estimations of blood-pressure under those conditions such for instance as would be made in the Snyder test and some of the others.

Dr. Grosvenor—The next paper for discussion is one by Dr. Exton on the Longevity Service of the Prudential Insurance Company—a subject in which many of us are intensely interested.

THE PRUDENTIAL LONGEVITY SERVICE

By William G. Exton, M. D.

Director Prudential Laboratory

The beneficent nature of life insurance is in no way better exemplified than by its interest in the public health. Branching and expanding logically and conservatively, hand in hand with the trends of modern medicine, this interest is now found devoted to the protection and salvage of individual lives. To this progress all of the advances made in science and humanism have more or less contributed. A catalogue of them is superfluous. Only mention of a few instances, such as Wasserman test, Roentgen ray, cancer prophalaxis, modern blood chemistry, focal infections, parasitology, etc., is needed to illustrate that these advances and their influences on medical thought and practise have made it possible to increase longevity by the application of preventive principles to the practise of medicine. Without them individualized longevity-promotion would still be waiting to attain its present prominence.

Prudential Urinalysis Service

For seven years I have had the fascinating privilege of conducting the policyholders' urinalysis service of The Prudential Insurance Company. The service was a very simple one. It consisted of making an annual urinalysis and reporting the results as normal or as disclosing indications which made it advisable for the sender of a specimen to consult his physician. Coupled with the last was an offer to send a complete report to the physician designated.

According to program, this service was from its very beginning the subject of constant study. Attention was focused on the wants and needs of individual policyholders as disclosed by their different social and clinical conditions and on the weighing of such ways and means as seemed likely to increase appreciably their span of life. Correspondence was searched for ideas, especially that of physicians, and death claims were re-

viewed in the light of urinalysis and other available information to glean whatever suggestions they might reveal for prolonging lives afflicted with different types of disease. From this it is evident that our study was clinical rather than statistical and that an attempt to register all of the impressions derived from the heterogeneous mass of extremely interesting data would bring this paper to an inordinate length. I must, therefore, limit myself in touching upon over 15,000 cases to the form of a summary.

1. There were many borderline specimens which an expert could not infallibly evaluate so as, on the one hand, not to cause unnecessary alarm and, on the other, not to miss a chance to do a real service. These point to the value of correlative information.

2. There are many diseases, some serious, which do not show in the urine. These indicate the danger of mere urinalysis lulling some into a false sense of security and also point to the need of correlative information in connection with urinalysis.

3. There were many volunteers, i. e., people who wrote that they wanted to help us out so that we could help them or who requested that their specimens be examined for some particular finding or with reference to some particular complaint. Many wrote fully and freely about themselves, usually referring to physique, diet, habits, complaints, personal hygiene, etc. The lesson they taught was unmistakable: there is also a real demand for an accessible source of authoritative information on matters involving heredity, climatology, hygiene, nutrition, fads, nostrums, etc.

4. Some of the physicians to whom our reports went requested additional urinalyses, sometimes other laboratory tests, and invited our cooperation or expressed appreciation of whatever assistance we were able to give them. They emphasized a lesson well worth learning; the mutuality of interest in the length of a life as between the company which insures it and the policyholder is so perfect as to accord the company a unique prestige, which may be brought to exert a beneficial effect on many people. To those physicians who asked for therapeutic

suggestions or specific information of different kinds we are indebted for the intimation that there is an unexplored field of usefulness in cooperating with practitioner and specialist along laboratory and scientific lines.

5. The sick and the ailing, as well as the healthy, expressed a definite demand for health-help. Consideration of the cases revealed the possibility of making greater mortality gains in this concentrated field than in any other in proportion to expenditure.

6. The persons who availed themselves of our service belonged to the following types:

(*a*) Prudent, healthy people. Obviously those who have no discoverable impairments can not be expected to reap an immediate advantage from any form of health examination. They constitute, however, the ideal; in fact, the only material which offers a chance to preserve good health, and they can best be served by impressing upon them the importance of reexamination and of early medical advice, should symptoms appear. To illustrate, the number of persons who get insurance one year but are rejected the next may be cited.

(*b*) Prudent people who believe themselves healthy, but nevertheless have impairments. This group is smaller and represents practically the only material which can be expected to give good results in connection with any form of health examination.

(*c*) Well and near-well people who believe themselves more or less sick. With others, this group contains the neurasthenics, hypochondriacs, faddists, sexy and finicky people, with fear and other complexes. They are generally the first to respond to offers and innovations of all kinds and do not, as a rule, suffer for want of medical information or misinformation. They give splendid mortality results, because they have complaints without corresponding impairments.

(*d*) Well people who use health services only when bothered with some acute or self-limiting condition, such as boils, colds, etc. They have the effect of simultaneously shrinking mortality figures and swelling the list of impairments found on examination.

(*e*) People with obstinate or chronic complaints who are inexperienced, careless, easily discouraged or unfortunate in not having fallen into the right hands. They try any available means to check up their doctors. Our service was, of course, not intended for any such purpose, but the group as a whole was inclined to volunteer information, and it was sometimes possible to help them by encouragement and in other ways.

(*f*) The sick. They have hitherto not received individual scientific aid from life insurance companies.

7. A tabulation showing ages, causes of death and urinary findings was made, but further statistical analysis was not undertaken, because my interest was clinical rather than mathematical, and I feared lest inexpertness in handling statistics might lead me to conclusions incompatible with human and medical experience. Of the deaths which occurred up to June, 1923, among those who used our service during 1916 and 1917, two-thirds (167) lived to be over 50. Of these almost one-fifth (32) were older than 70, pointing to a preponderance of older lives. Counting all claims, there were 240 deaths among 6,200 lives exposed, with a liberal allowance for possible lapses, etc., an average of six and one-fourth years, giving about 39,000 years of exposure, as an actuary would put it. The service cost about $7,000. In a report published this year the results of physical examinations made by the Life Extension Institute for the Metropolitan Life Insurance Company showed 217 deaths among 6,000 lives exposed for five and one-half years, or about 33,000 years of exposure, with an expense of $49,000.

If ours or any other examination service can show results as good as these at the present time, I feel convinced that the real reasons lie in the facts that the experience did not cover a sufficiently long period of time and that the class who used the service was one which would have given a low mortality under any circumstances. This opinion is strongly fortified by the fact that more favorable mortality actually followed simple urinalysis than was shown by the results after full physical examination.

Let me hasten to add that regardless of statistics the longevity-promoting value of the periodical examination is, in our opinion, as unquestionable now as it was before statistics were available.

The Periodical Examination.

The scientific basis of the periodical examination rests upon common knowledge and experience. As Dr. Rankin says, "There is no sharp line of distinction between health and disease. One fades by almost imperceptible gradations into the other." From this it follows that the true significance must, as Mr. Little has expressed it, lie "in treating the human machine as one requiring continuous care and not merely spasmodic attention upon a breakdown." Seen in this light the periodical examination is a scientific and prudent method for preventing unnecessary suffering and premature death.

Osler once said that those who wanted to attain a ripe old age should get a chronic disease and take care of themselves, implying, of course, that the disease must be discovered early. The periodical examination as we now know it, however, originated with Dr. George M. Gould, who pointed out to physicians the advantages that would accrue to their patients from periodical examinations, no matter how well they felt. The practise has been gaining ground in a haphazard way, and as Dr. Dickie has pointed out, has received its greatest impetus from war experiences and, undoubtedly also, from the activities of impersonal agencies which are in a position to advertise in the public press.

It is interesting to note that Dr. Gould's original paper, reprinted in the *Scientific American,* contains, with other suggestive material which no student of the periodical examination can afford to miss, all of the valid arguments which have since been used to exploit the periodical examination. Twenty-three years ago Dr. Gould said, "All good medicine inevitably tends to become preventive medicine; all good physicians labor to stop disease before it arrives. The whole ingenuity of the trained diagnostician is expended on the problem of the earlier symptom. He is the greatest discoverer who finds the *pre-*

symptom, or the symptom of a symptom. The greatest therapist is he who cures before the disease exists, he who starves the bacillus to death, he who stops the evil habit, thus preventing the malfunction which becomes organic disease. . . . . There are a hundred known intimations of oncoming disease, but there are a thousand undiscovered *presymptoms.*"

The connotation involved in the concept *presymptom* is that borderline field between health and disease, in which physicians are constantly struggling to function successfully with the aid of earlier and earlier diagnosis. The effort to arbitrarily partition this field and to take a part of it out of the hands of the family physician must result in depriving the periodical examination of its greatest scientific and humanitarian value, because the effort, if successful, would withhold from the practitioner of medicine the invaluable knowledge to be gained by making repeated examinations of the same individual in health and in sickness.

Longevity can not, of course, be increased by periodical examinations unless the knowledge and experience developed by such examinations become public property within the profession, and scientific values are bound to be lost if others than practitioners do this work, because the periodical examination then degenerates into a routine mechanical search for indications for treatment. Under such circumstances a clinical diagnosis is, of course, impossible, and an inadequate regional diagnosis is substituted for it, which merely points a finger at a part of a person's anatomy and tells him to go to his doctor to have him find out what it means and treat it. Such an examination is, of course, incomplete and, even with the best intentions, leads to treatment without diagnosis, because of the difficulties inherent in distinguishing between hygiene and therapy.

No matter how thorough or how perfect the periodical examination, the utmost result that can be expected of it is limited to the efficiency of the doctor selected by the patient to treat him, and the treatment can be effective only to the extent of the correctness of that doctor's diagnosis. The periodical

examiner's diagnosis must, therefore, be accepted, rejected or corrected by the family physician to conform with his personal judgment. Thus any other examining agency than the practitioner becomes in the last analysis a mere agent for directing a man to go to his doctor.

As a result of the family physician's natural prejudices against or antagonisms to a stranger, whom he regards as interfering with his prerogatives and capacities, the subject often suffers by being left suspended, as it were, in doubt and worry between conflicting diagnoses and advice.

Meltzer and others have objected to the periodical examination on the ground that it had the bad effect of creating in many people unnecessary worry and alarm. He had in mind, of course, the many psychological imponderables which go into the making of a human personality and the dominating roles these play in symptomatology and diagnosis. The family physician, being accustomed to reckon with personality and human nature and to treat his patient as a social being, is, therefore, the only one who is in a position to avert the danger which Meltzer saw, because any other kind of examiner is necessarily restricted to looking upon an individual as a mere subject for observation.

In the sense that even the healthiest expect to be ill some time the word "patient" need not be synonymous with the word "sick." If all of the information about a patient gleaned from periodical examinations made during years of health is in the keeping of the attending physician when illness comes, it is not lost at a time when it may prove to be the controlling guide to correct diagnosis and successful treatment. As the significance of an abnormality or symptom is best determined by correlating it with previous findings, the periodical examination may be made to extend its benefits into the sickroom if the individual learn to let the doctor who will treat him in sickness know him also in health.

In the light of Sir James Mackenzie's work periodical examinations made by others than the family physician lose their chief advantages, and as the literature of the subject does not

reveal a single contradictory premise, these main considerations suffice to bring one into agreement with Dodson that "the movement is impotent without the cooperation of the family physician." The attitude and activities of the American Medical Association and National Health Council in connection with the periodical examination add force to the inescapable conclusions that the greatest increase of longevity which the periodical examination can be made to yield will be secured by cooperation with the medical profession and that the best service which it is possible to render our policyholders is enlightenment and encouragement to establish the relationship of physician and patient.

Other Longevity Considerations.

More light was thrown upon the problem of individualized longevity promotion by the study of a not inconsiderable human material. For some years I have been making it a practise to regard individuals with whom I have come into contact as objects to be kept alive and have tried by inquiry and examination in each case to decide what ways and means would prove most effectual in prolonging that life. The material was particularly instructive when divided into two main groups: those with symptoms and those without symptoms.

The first group, it is evident, has nothing whatever to do with periodical examinations, because the person who has a symptom or complaint wants a cure. A cure depends upon treatment based upon clinical diagnosis, and the periodical examination, of course, does not pretend to supply that need. It follows therefore that the only means of aiding the members of this group to greater longevity is enlightenment as to the advantages to be derived from seeing the family physician early and the dangers of delay in failing to do so. The importance of determining the significance of early but often vague symptoms or complaints is a factor in longevity promotion which profession and public alike should be helped to realize.

The second group is of greater interest, because it includes all of the lives which have no symptoms or complaints, but

which are nevertheless affected by degenerative and other progressive diseases that are insidious in their incipiency.

Investigation of the symptomless group teaches that the discovery of such conditions among them is almost always made by means of some kind of laboratory test. Some years ago in the course of a study of albuminuria about 10,000 insurance examinations made by qualified examiners were reviewed and at that time the rarity of detecting abnormal physical signs by examining people who denied having symptoms was noted as striking. No statistical information bearing directly upon this point seems to be available, but the large percentage of urinary impairments reported by agencies making periodical examinations is in close correspondence with clinical and insurance experiences, which indicate that people without symptoms or complaints seldom show abnormal physical signs.

It is also interesting to note, in passing, that when physical signs denoting impairment are found in the exceptional symptomless cases, the significance is generally so doubtful as to require an extended period of clinical observation for estimation, because the identical sign does not have the same pathological meaning in every individual. Thus an atypical note over the pulmonary apices or a deviation from the ideal position of the heart-beat, which may be perfectly normal for many individuals, is apt to be a pitfall of unnecessary alarm for the strange examiner. It becomes thus apparent that the discovery of impairments in the symptomless group is almost wholly dependent upon clinical pathology.

The growing importance of the laboratory in diagnosis and treatment is an outstanding development of the practise of medicine which for some time has been regarded by those interested in medical education and progress as a problem requiring solution, because the weakest link in the scientific armor of the general practitioner is clinical pathology.

The family physician can not, of course, be expected to have either the expensive and elaborate equipment or the time-consuming training of a competent clinical pathologist; nor do the exigencies of his labors with the sick favor him with the time

and moods requiring for carrying out technical procedures and exact manipulations. The general practitioner does his full duty by his patient when he is alert to the usefulness of clinical pathology and is willing to take advantage of it and learn to correlate laboratory results with symptomatology.

Clinical pathology represents an array of facts and procedures, the offsprings of medical research, and the clinical pathologist is a specialist who bridges the gulf between the research-worker and practitioner. New facts and methods are constantly being brought to light, which afford the practitioner who makes use of them a closer and truer insight into the diagnosis and treatment of the individual case. Therefore a means of providing the family physician with the ready use of precise laboratory findings and correlations is bound to be a substantial contribution to the promotion of longevity.

The Prudential Longevity Service

The results of the study of our simple urinalysis service in conjunction with the foregoing facts and considerations have led to the formulation of the Prudential plan of longevity promotion, which in March of this year became effective under the name of The Prudential Longevity Service. The basis of the service is cooperation with the policyholder and his family physician in conserving health and promoting longevity. More than a million policyholders are already eligible to the service under the company's rules and come easily within its scope through the most convenient branch office or by direct application to the home office.

As the service is devoted exclusively to promoting the health and prolonging the lives of Prudential policyholders, it is offered with the understanding and agreement that any and all information or findings developed in connection with it will be treated as strictly confidential and without prejudice or effect on past, present or future insurance-standing. It is also expressly stipulated that in no case will an attempt be made to diagnose or to give treatment by mail.

The company aims to help the sick as well as the healthy and operates two distinct types of service: one for those who regard themselves as well and the other for those who are either under the care of a physician or in need of medical attention. Either service is available according to the preferences and physical condition of the policyholder, and the plan permits of automatic transfer from one service to another as developments in the health of a policyholder dictate.

The operating equipment of The Prudential Longevity Service includes an up-to-date clinical pathological laboratory, in which the analyses and examinations are made and has a section devoted to research directed toward augmenting the usefulness of the service. Its adequate personnel is under the direction of a physician qualified to correlate laboratory findings with health data furnished by policyholders and physicians.

In conjunction with this The Prudential has established a modern medical library, with files of current journals and a competent staff, in this way creating an easily accessible fund or source of health, medical and biological information, on which policyholders and their physicians can draw at any time and in which material is prepared for placing at the disposal of the policyholder's physician the very latest authoritative scientific information bearing upon diagnosis, therapy or other features involved in the study of a particular case.

Policyholders who believe that they are well and in good health are encouraged to choose one of several ways of availing themselves of the annual type of service designed for the healthy. They are offered a urinalysis report or a health "check up," consisting of urinalysis report and correlation of the urinary findings with information regarding physique, health and personal history, submitted by the policyholder on a special form designed for the purpose. The correlation is made in the form of notes and comments and hygienic suggestions and often with especially prepared printed or photostat matter.

If the information developed in the course of the service discloses any other condition than good health, the policyholder becomes automatically eligible for the type of service designed

for the sick and the ailing, which does not function without the cooperation of the personal physician.

In order to encourage Prudential policyholders to acquire the habit of having themselves periodically reexamined by their family physician, an extension of this service provides a uniform physical examination blank for the guidance and convenience of the doctor. With this completed, a Wasserman or other blood test is offered in addition to urinalysis, and all of the data are included in the correlation, which is made in the same form and under the same conditions as the annual "check-up" type of service.

The form furnished policyholders in connection with the service does not call for hard and fast answers. It is in reality intended to be more of a guide or reminder than anything else and invites the fullest and freest expression of every-day experiences, under such headings as recreation, exercise, occupation, appetite, diet, sleep, tobacco, alcohol, other beverages, patent medicines and drugs, frequency of urination and bowel movements, habits, tendencies to colds, sore throats, headaches, indigestion, shortness of breath and "tired feeling," condition of teeth and skin, height, weight, age, operations, etc.

The same kind of form is employed in connection with the service given the sick and the ailing, but additional headings referring to specific symptoms and more particulars of prior illness and operations are provided. As this type of service requires the cooperation of the attending physician in order to function, it does not become operative until the policyholder's physician has examined him and sent in the completed uniform physical examination blank.

From that point on, according to the needs of the case, The Prudential through its longevity-service laboratory and library, cooperates with the policyholder's physician, thus making available to the policyholder the complete facilities of the Prudential longevity service, which include, in addition to the usual urinalyses, any blood, sputum or other clinical pathological tests which may be indicated by the condition of the person or requested by his physician.

With the cooperation of the attending physician, this service is conducted in a personal and fraternal way. Scientific inquiries are answered by collating the appropriate material found in the library for the reply, and when helpful, suggestions relating to diagnosis and therapy or other features may be offered. In addition to this, there are available for the physician printed material bearing upon the most frequent subjects of inquiry, such as tables of food values, age, height and weight, and other data, relating to nutrition, pharmacology, etc. All of this is employed in conjunction with the facilities of the Prudential laboratory in making such studies as sugar-tolerance or renal function, etc., and correlating the results with the clinical data.

The Prudential furnishes all of its logevity services, including the necessary mailing-packages, free of charge to its policyholders.

The absence of red tape in the operation of the different services is also to be noted, as well as the fact that the facilities for aiding the sick and the ailing are available at any time the policyholder needs them.

It is thus evident that the plan is elastic and adaptable to future scientific developments and that it allows a pursuit of the course of events in the condition of a policyholder which lends force to the aid given to prolong his life.

Service is given in the spirit of an active, personal interest, and it is a dominant note in the conduct of the Prudential longevity service to cultivate a feeling of intimacy by treating the details of correspondence with policyholders in a clear, colloquial way, avoiding as far as possible technical terms or pedagogic tone.

The task of making satisfactory clinical pathological facilities available in every town and hamlet was found to involve many difficulties, and it was necessary to prepare for the service by making special investigations in Prudential laboratory, which led to the solution of many of the problems connected with getting the different materials for examination through the mails into the laboratory in a fit condition. New methods and apparatus and appropriate containers and mailing-packages of

different kinds were devised and are now in use. With the development of a tube for collecting and getting into the laboratory satisfactory specimens for the Wasserman test, it can be said at the present time that the service is in a position to offer its patrons practically all of the important clinical pathological tests.

Some phases of blood chemistry present problems which are now being studied in the hope of soon making practicable the addition to the service of a more complete system of blood analysis, and it is expected to continue research-work, in order to bring within the scope of the service all new tests that may prove to be of clinical value.

The unique position of an insurance company for acquiring statistics in connection with the experience developed by the Prudential Longevity Service should eventually result in information regarding complete life histories and diseases, which, it is hoped, will prove of real importance to clinical medicine.

In conclusion, it may be said that the personal application of the latest authoritative scientific knowledge and the ready clinical laboratory facilities adapted to the needs of the individual case constitute ways and means of discovering and curing evil tendencies, defects, infections and other poisons which cause disease. With the cooperation of the medical profession the Longevity Service as conceived and made effective by The Prudential Insurance Company offers every eligible policyholder, wherever situated, something of health value as well as protection against needless suffering and untimely death.

DISCUSSION

Dr. Grosvenor—This paper is open for general discussion. Dr. Muhlberg's Company has had some experience with conservation work and I know that Dr. Exton would like to hear from Dr. Muhlberg.

Dr. Muhlberg—I don't believe that Dr. Exton's paper ought to go without some discussion. I feel there are so many good points in it that I would like to have Dr. Exton send me, and

I believe he will be willing to send to all of us who are members of the Association, a full list of the forms he uses in connection with his work, because we are using forms now that are not satisfactory and I am convinced that we would get some very valuable suggestions from him by copying some of his forms.

Personally, I am thoroughly sold on the idea of the value of conservation work. I am not entirely convinced by the statistics. I do not believe our statistics are going to prove anything, in spite of the fact that the statistics published by the Metropolitan are very favorable. The fact that they are so is of course in favor of a conservation plan, but as Dr. Exton pointed out in his paper, the policyholders who respond to the test are distinctively of two classes—a small percentage who will send in samples of urine because they want to check up their own doctor. They know they have diabetes, blood in the urine, etc. These of course are going to show a high mortality. The second class, by far the greater percentage, are the persons who are naturally introspective and conservative, watching their health carefully, and they are going to live long even if they never applied for conservation examinations.

I do believe that in most chronic cases, an early diagnosis is essential in order to avert serious consequences, and I know of many instances where our examination has been of real value. One of our Cincinnati policyholders submitted a sample of urine to us. He considered himself in perfect health. We found pus and blood. As he lived in Cincinnati, he acted on our advice and called at the Home Office. I had an interview with him, and I suggested that he go to a genito-urinary surgeon, who made a very careful test and found that he had a tubercular kidney, and he advised an operation. The man submitted to the operation, and the surgeon told me after a while that he operated just in time. He removed the kidney and the man is today in perfect health. He immediately regained weight. He had had no previous symptoms calling attention to this condition, and I have no doubt that we saved that man's life. I could cite numerous other cases.

I believe the results of Conservation work must be judged very much from the cases individually. We cannot rely solely on statistical information. But I am convinced that if you will engage in this work you will become as enthusiastic as are the Medical Directors of those companies who are doing it, and I trust the result of Dr. Exton's paper will be to induce some of you to engage in conservation work.

Dr. Grosvenor—Others of our members are engaged in this conservation work. I know we would all like to hear from them.

Dr. Daley—The Equitable is still keeping up its conservation work and we agree with Dr. Muhlberg that it is really worth while from every standpoint.

Dr. Grosvenor—Has Dr. Patton anything to add to what Dr. Exton has said?

Dr. Patton—I am sorry, Mr. President and Gentlemen, that the galley-proof of Dr. Exton's paper was not distributed in time to give the members an opportunity to read and discuss the paper. We feel that in this Longevity Service which we are trying to do, we are rendering a real service to the policyholder and at little expense to them or to the company.

Dr. Grosvenor—Will Dr. Exton close the discussion?

Dr. Exton—I really have nothing to add. Our forms are naturally in the experimental stage. We haven't had them long enough to make a real test of their efficiency. If anyone wants copies of these forms, we shall of course be very glad to furnish them, and will appreciate at the same time any suggestions in regard to them.

Dr. Grosvenor—The last paper on the program is one by Dr. Muhlberg on a subject which appeals to every member of the Association as one of the greatest importance—the selection of Medical Examiners.

THE SELECTION OF MEDICAL EXAMINERS FOR LIFE INSURANCE.

By Wm. Muhlberg, M. D.

Medical Director, Union Central Life Insurance Company.

During the past summer, I addressed a circular letter to about forty-six Medical Directors of Insurance Companies, members of this Association, relative to their method of appointing medical examiners, and after receiving the replies, I was interested to note that there is a marked difference in the practices employed by the various companies.

Considering the importance of this subject, it is rather astonishing that it has not received fuller consideration in the deliberations of this Society. Dr. Wm. R. Ward, in 1916, read an excellent paper on "The Best Way to Obtain Better and More Careful Medical Selection from Examiners in the Field," which was ably discussed by Dr. Merchant; but this paper stressed the instructions to examiners, rather than specific methods of their appointment. It seems to me a discussion of this topic might clarify our ideas and lead to suggestions that would assist many of us in the conduct of this important phase of our work.

Within recent years, very notable changes have taken place in the personnel of the medical profession and the character of the medical schools. Formerly, there were practically no restrictions on any one's practicing medicine—it was apparently not necessary even to graduate from a so-called medical school. State examinations were unknown. Many of the medical schools were diploma mills, organized either for profit or for the purpose of enabling certain ambitious practitioners to append high-sounding titles of "Professor," etc., to their somewhat dubious titles of doctors. No effort was made to check the qualifications of prospective medical students; with few exceptions, entrance examinations were not required or even encouraged by medical schools; and no effort was made by many schools to do any actual teaching. The instruction was

often purely didactic, without laboratory or bedside instruction. One of the so-called medical schools in Cincinnati dispensed even with lectures—apparently all that was needed was the payment of registration and tuition fees and after a lapse of eighteen months, there was conferred with elaborate ceremonies on the new-fledged doctor, a highly ornate diploma.

Strangely enough, graduates of poor schools occasionally developed into good physicians and I believe in one or two instances reached eminence in their profession; but at what cost to the public, or if they happened to be insurance examiners, at what cost to the insurance companies, will never be known.

Fortunately, through the efforts of the American Medical Association, the Carnegie Foundation for the Advancement of Teaching, various state and local medical associations throughout the country, these evils were remedied, with the result that the number of medical schools declined, through natural death or fusion, from some hundred and forty good, bad and indifferent to eighty, for the most part excellent or very good. The great majority of medical schools now require high school, premedical college courses or college degrees for entrance requirements; the courses run four years, with splendid laboratory facilities and efficient bedside teaching. Interneships after graduation are the rule rather than the exception and our postgraduate courses, in many cases excel those offered abroad. Insurance companies would indeed be ungrateful if they failed to record their appreciation of these changes, for not only has the evolution supplied us with better examiners, but it has likewise safeguarded the health of our policyholders, as well as the public at large.

I have had the opportunity of gauging, through personal experience, exactly how important for insurance work is a first-class medical school education. Over a period of about ten years, I taught intermittently at three schools—one high-class, one average, and one very poor. I often wondered how the graduates of the poor school could summon enough courage to put up their shingles. They knew nothing of laboratory work;

physical diagnosis to them was merely a text-book knowledge of terms; and their clinical experience was confined to observing a few charity patients—mostly gonorrhoea—in a free outdoor clinic.

The improvement throughout the country in the quality of the medical schools has greatly simplified the question of securing the services of efficient examiners, especially in the larger cities. The problem, however, still remains at times a perplexing one in the smaller towns and country districts. Through a process of "the survival of the fittest," the poorly qualified practitioners gravitate to the small towns and to the country districts; the efficient doctor's goal is the big town and the specialty. There are, of course, exceptions, but this tendency is very manifest.

Our problems are further complicated, because it is usually possible to appoint the examiner in a large city after a personal interview with some representative of the Medical Department; but this plan is difficult, time-consuming and not wholly satisfactory, where the need of an immediate appointment arises in a small town.

Our Company grappled rather unsuccessfully with this difficulty for many years. Our old method permitted our agent to recommend some doctor for appointment. He chose, quite naturally, the doctor who conformed most agreeably to his needs and demands. We further stipulated that such a prospective examiner submit with his application, a formal statement of endorsement by two practicing physicians—preferably examiners of the Company—and of course, the doctor was careful to select for such endorsements, his personal friends in some neighboring towns. An inspection report was then ordered and if this was favorable, the appointment was made. It is quite obvious that such a method gives the agent practically full power of appointment, and of course encourages a selection not to the Medical Department's interests. It is a noteworthy fact that in a small town, where only three or four doctors are located, the poorly qualified physician can successfully compete with others whose training has been excellent, provided he

lightens his handicap by tact, adroitness, clever advertising and a nimble wit—qualifications that appeal to the agent, but not to the Medical Department.

About fifteen years ago, we abruptly changed our system—not without some disapproval of the agency force. We decided, where it was impossible to choose an examiner through a personal interview with an officer of the Medical Department, that the selection would be made solely on the basis of medical training and interne experience, checked up by a Retail Credit Company inspection.

The Company I represent has never used traveling medical inspectors; much is to be said pro and con as to the value of such representatives, and I think this subject might well merit a discussion by this Association. Since the executive officers of our Company were opposed to the system of medical inspectors, we in the Medical Department were compelled to operate without them.

I do know this: That in Cincinnati, where the insurance examiners were selected by the traveling medical representatives, the choice was not always the best. In several cases, the examiners selected were men of good local reputation and large practice, but of very poor diagnostic ability—information which I knew to be accurate because I had worked with them in clinics, in hospitals, in consultation, etc. The examiners who were doing the best work were those who had graduated from good schools, had devoted at least a year to a post-graduate interneship in a large hospital and who were either in general practice or in such specialties as internal medicine and pediatrics.

At the outset, we graded all medical schools into five groups, basing our classifications principally on the percentage of failures of the graduates of these schools at the State examinations—data published annually by the Journal of the American Medical Association. We also consulted liberally, the reports of the Carnegie Investigation. After we had classified our colleges according to this system, we were rather pleased to note a few years later, that the American Medical Association made

a similar classification in three groups, which harmonized very closely with our ratings.

Our groups are designated—A, B, C, D, E—and comprise about 450 schools, most of which are now extinct or merged with better schools. However, it must be remembered that while colleges may expire, their graduates continue to survive, and it is a fair assumption that on the average, the medical qualifications of the graduate about equals the standing of his alma mater at the time of his graduation. The same college may have two or more ratings, depending upon the improvement in its curriculum—such improvement being reflected in a lower percentage of failures at the State examinations. I have had printed, a complete rating list of these colleges, for distribution among those of you who care to give this system further consideration.

We grade our examiners as follows:

Graduates of "A" colleges, who have practiced five years and who have had at least twelve months' experience as interne after graduation in a large general hospital, are rated as $25,000 examiners—the highest grade. Without such an interneship, we rate them No. 1.

Graduates of "B" colleges are rated No. 1, if they have had interne experience; or No. 2, if not.

Graduates of "C" colleges are rated No. 2 or 3, on the same basis of interneship.

Graduates of "D" colleges are rated No. 3 or No. 4, depending on interneship.

Graduates of "E" colleges are rated No. 4 or No. 5.

Arbitrarily, too, we accept examinations for amounts of—

$25,000	from our	$25,000	examiners,
20,000	" "	No. 1	"
15,000	" "	No. 2	"
10,000	" "	No. 3	"
5,000	" "	No. 4 or No. 5	examiners.

We further stipulate that where there are two or more examiners in any town of unequal rating, the doctor with the

highest rating must be used; if not, a signed statement must be submitted by him, explaining why he was not used.

We send our General Agents and Managers a section of the American Medical Directory covering their territory. The American Medical Directory gives the name, age, specialty, college of graduation, year of graduation and address of all doctors in any particular town. In event we have no examiner in any locality, the General Manager or Agent, who is fully advised of our rules and college ratings, is authorized to use the physician who ranks highest, according to our method. We, of course, recheck his choice and inspect the doctor at the Home Office. By this means, we eliminate entirely the personal selection of the agent and as a result, controversies between the agency force and the Medical Department have been reduced to a minimum.

The theory of our selection is practically identical with that of the selection of insurance risks, based on Numerical Rating. There is absolutely no doubt in my mind that one thousand physicians, graduates of good schools, with good interneships, will on the average supply better material for a corps of efficient medical examiners than will a thousand doctors who are graduated from inferior schools and who have had no interne training. I am inclined to believe that in the long run, it gives as good results as the selection by personal interview with traveling medical or lay representatives, particularly in the smaller towns and rural districts, not easily accessible to frequent visits by inspectors. Of course, in the big cities, where a personal investigation can be carefully conducted, an interview with the prospective examiner is desirable.

In our experience, there has been only one difficulty: Occasionally, a graduate of a very high-class college, with the very best training, will lack "insurance sense." Fortunately, this can be detected after such an examiner has made a few examinations and the matter is easily remedied. This, to my mind, is not so serious a fault as gross incompetence, which may not be detected for several years—perhaps only after a large volume of poorly examined business has been accepted by the Com-

pany. We have never found that any of our high-grade examiners were grossly incompetent; practically always, such incompetence, when it occurs, is seen in our No. 4 or No. 5 examiners.

As an example: It was our practice for many years to require, for all applicants aged forty or over, that the doctor examine the samples of urine and forward a portion of the same sample and his report to us. Our high-grade doctors practically never failed to detect significant amounts of albumen and sugar. The work of our lower grade examiners was such as to lead us to doubt whether many of them knew anything at all about chemical urinalysis—sugar in excess of one per cent and marked albuminuria being frequently overlooked. And I have no doubt that their heart and lung examinations and blood pressure estimations were equally untrustworthy.

Our system is not inflexible. Whenever a poorly rated examiner demonstrates through good work and by a favorable mortality experience covering some years of work, that he is well qualified, we promote him to a higher class, and vice versa.

I should be loath to leave the impression that I believe this rating system of examiners is superior to the selection by traveling inspectors. I do believe that for companies in our position, who do not employ traveling medical representatives, that the system works satisfactorily and efficiently.

I am rather firmly of the opinion that our method is better, particularly for the small town, than that which relies on the recommendation of the local examiner or the examiner of the neighboring town. I practiced medicine in a small western city for almost two years. It is almost invariably the rule that where there are several physicians in a town of a population of one to twenty thousand, factional jealousies, etc., will split the profession into groups, that make it very difficult for any one doctor to recommend for an insurance appointment, a physician who is not in his own clique. Since each faction is usually headed by a man of ability, the tendency, where additional examiners are needed, is not to secure the services of the two or three best qualified examiners.

Nor is this entirely overcome by relying on the recommendation of an examiner of the neighboring town; considerations of friendship, referred consultations, competitive rivalry in neighboring territories, naturally influence the choice. Furthermore, the examiner of the small town is not always well informed as to the qualifications that are desirable in insurance examiners. His knowledge of this important phase of our work is about as limited as his knowledge of the medical selection of risks for insurance.

In my circular letter to the forty-six Medical Directors of other companies, I asked especially whether they used traveling medical inspectors, and if not, what method of selection they used. The replies indicate a wide divergence in practice among these companies. In a general way, the methods may be grouped into ten different classes:

I. Four companies employ traveling medical inspectors, but only one of these companies relies solely on the selection of the inspector. Forty-two of the companies do not use the medical inspector.

II. Three companies employ lay inspectors, who visit and recommend or nominate new medical appointees.

III. One company relies solely on the selection of medical referees.

IV. Nine companies rely principally on the recommendation of other examiners in the same or neighboring city or town.

V. Nine companies select their examiners either through local examiners or permit their agents to nominate prospective examiners.

VI. Eight companies permit their agents to nominate the examiners, but the agent's choice is re-checked through correspondence with other companies, local examiners, inspections or Home Office selection.

VII. Three companies permit doctors to apply directly for a position of examiner; the selection is checked by inspection, through other companies and the recommendation of other examiners.

VIII. One company relies mostly on the choice made by other companies.

IX. Six companies failed to describe their method, merely indicating that no traveling medical inspectors were employed.

X. Two companies, like our own, relp principally on the records of the American Medical Directory.

Most companies inspect prospective examiners and whenever possible, especially in larger cities, an officer of the Medical Department visits the examiners at available opportunities.

Many of the Medical Directors favor the Medical Inspector System, but are debarred from using it on account of the expense and the fact that one or two inspectors can not effectively cover a large field. Several of the Medical Directors offered the suggestion that it might be wise for companies to co-operate in the matter of traveling medical inspectors, and from the remarks of some, it appears obvious that they would rather favor the establishment of a Bureau similar to our M. I. B., whose function it would be: First, to exchange card records of appointment, efficiency rating, careless work, habits, dishonesty, etc.; and secondly, to employ a staff of traveling medical inspectors, whose reports would be gathered by the Bureau and thence transmitted to the various companies. The expense of such a Bureau would, of course, be distributed pro rata.

There is much to be said both for and against such a plan and I will not venture to discuss it, except to suggest that it does merit some consideration.

TABLE FOR RANK OF MEDICAL COLLEGES.

Key	Rank	Key	Rank	Key	Rank
ALABAMA		Ark. 2	D	Cal. 3	E
Ala. 1	E	Ark. 3	E	Cal. 4	E
Ala. 2	C	Ark. 5	E	Cal. 5	D
Ala. 3	E	**CALIFORNIA**		Cal. 6	B
Ala. 4	C	Cal. 1	C	Cal. 7	E
Ala. 5	E	Cal. 2		Cal. 8	C
ARKANSAS		Before 1900	B	Cal. 9	C
Ark. 1	C	1900 and After	A	Cal. 10	E
				Cal. 11	A

Key	Rank
Cal. 12	
Before 1920	D
1920 and After	C
COLORADO	
Colo. 1	C
Colo. 2	
Before 1920	B
1920 and After	A
Colo. 3	E
Colo. 4	D
Colo. 5	B
CONNECTICUT	
Conn. 1	
Before 1900	B
1900 and After	A
DIST. OF COL.	
D. C. 1	
Before 1920	C
1920 and After	B
D. C. 2	
Before 1920	C
1920 and After	B
D. C. 3	E
D. C. 4	C
D. C. 5	E
FLORIDA	
Fla. 1	E
GEORGIA	
Ga. 1	
Before 1920	C
1920 and After	B
Ga. 2	E
Ga. 3	E
Ga. 4	E
Ga. 5	
Before 1915	C
1915 and After	B
Ga. 6	E
Ga. 9	E
Ga. 10	C
Ga. 11	C
Ga. 12	C
Ga. 13	E
Ga. 14	E
Ga. 15	E
Ga. 16	E
Ga. 17	E
Ga. 18	E
Ga. 19	E
ILLINOIS	
Ill. 1	
Before 1900	B
After 1900	A
Ill. 2	E
Ill. 3	E
Ill. 4	C
Ill. 5	E
Ill. 6	
Before 1900	B
1900 and After	A
Ill. 7	E
Ill. 8	
Before 1920	D
1920 and After	C
Ill. 9	E
Ill. 10	E
Ill. 11	
Before 1920	B
1920 and After	A
Ill. 12	E
Ill. 13	E
Ill. 14	E
Ill. 15	E
Ill. 16	E
Ill. 17	E
Ill. 18	E
Ill. 19	D
Ill. 20	E
Ill. 21	E
Ill. 22	C
Ill. 23	E
Ill. 24	E
Ill. 25	E
Ill. 26	E
Ill. 27	E
Ill. 28	E
Ill. 29	E
Ill. 30	E
Ill. 31	E
Ill. 32	E
Ill. 33	E
Ill. 34	E
Ill. 35	E
Ill. 36	E
Ill. 37	E
Ill. 38	E
Ill. 39	E
Ill. 40	E
Ill. 41	E
Ill. 42	E
INDIANA	
Ind. 1	E
Ind. 2	E
Ind. 3	E
Ind. 4	E
Ind. 5	E
Ind. 6	E
Ind. 7	E
Ind. 8	C
Ind. 9	C
Ind. 10	C
Ind. 11	E
Ind. 12	E
Ind. 13	E
Ind. 15	E
Ind. 16	E
Ind. 17	E
Ind. 18	C
Ind. 19	E
Ind. 20	A
Ind. 21	E
Ind. 23	E
Ind. 24	E
Ind. 27	E
IOWA	
Iowa 2	E
Iowa 1	C
Iowa 3	
Before 1910	B
1910 and After	A
Iowa 4	B
Iowa 6	C
Iowa 7	E
Iowa 8	D
Iowa 9	C
Iowa 10	C
Iowa 11	E
KANSAS	
Kan. 1	E
Kan. 2	
Before 1915	B
1915 and After	A
Kan. 3	C
Kan. 4	C
Kan. 5	E
Kan. 6	E
Kan. 7	E
KENTUCKY	
Ky. 1	D
Ky. 2	
Before 1915	C
1915 to 1920	B
1920 and After	A

Key	Rank
Ky. 3	E
Ky. 4	C
Ky. 5	D
Ky. 6	E
Ky. 7	E
Ky. 8	E
Ky. 9	D
Ky. 10	E
Ky. 11	D
LOUISIANA	
La. 1	
Before 1900	B
1900 and After	A
La. 2	E
La. 3	E
La. 4	E
MAINE	
Me. 1	
Before 1900	B
1900 and After	A
Me. 2	E
Me. 3	E
Me. 4	E
MARYLAND	
Md. 1	
Before 1915	C
1915 and After	B
Md. 2	E
Md. 3	C
Md. 4	C
Md. 5	E
Md. 6	D
Md. 7	A
Md. 8	E
Md. 9	D
Md. 10	E
Md. 11	E
MASSACHUSETTS	
Mass. 1	A
Mass. 2	E
Mass. 3	E
Mass. 4	E
Mass. 5	
Before 1910	C
1910 and After	B
Mass. 6	E
Mass. 7	B
Mass. 8	E
Mass. 9	E
Mass. 12	E
Mass. 13	E
Mass. 14	E
MICHIGAN	
Mich. 1	
Before 1900	B
1900 and After	A
Mich. 2	C
Mich. 3	E
Mich. 4	E
Mich. 5	B
Mich. 6	E
Mich. 7	
Before 1910	C
1910 to 1920	B
1920 and After	A
Mich. 8	C
Mich. 9	C
Mich. 10	C
Mich. 11	E
Mich. 12	E
Mich. 13	E
Mich. 14	E
Mich. 15	E
Mich. 16	E
MINNESOTA	
Minn. 1	E
Minn. 2	E
Minn. 3	E
Minn. 4	
Before 1910	B
1910 and After	A
Minn. 5	C
Minn. 6	E
MISSISSIPPI	
Miss. 1	E
Miss. 2	E
MISSOURI	
Mo. 1	C
Mo. 2	
Before 1900	B
1900 and After	A
Mo. 3	B
Mo. 4	E
Mo. 5	E
Mo. 6	E
Mo. 7	E
Mo. 8	C
Mo. 9	E
Mo. 10	E
Mo. 11	E
Mo. 12	E
Mo. 13	E
Mo. 14	E
Mo. 15	E
Mo. 16	E
Mo. 17	E
Mo. 18	E
Mo. 19	E
Mo. 20	C
Mo. 21	E
Mo. 22	E
Mo. 23	E
Mo. 24	C
Mo. 25	E
Mo. 26	E
Mo. 27	C
Mo. 28	D
Mo. 29	E
Mo. 30	E
Mo. 31	E
Mo. 32	C
Mo. 33	E
Mo. 34	
Before 1920	B
1920 and After	A
Mo. 35	E
Mo. 36	E
Mo. 37	E
Mo. 38	E
Mo. 39	E
Mo. 40	E
Mo. 41	E
Mo. 42	E
Mo. 43	E
NEBRASKA	
Neb. 1	E
Neb. 2	E
Neb. 3	E
Neb. 4	E
Neb. 5	
Before 1908	C
1908 to 1920	B
1920 and After	A
Neb. 6	
Before 1908	C
1908 to 1920	B
1920 and After	A
Neb. 7	E
Neb. 8	E

Key	Rank
NEW HAMPSHIRE	
N. H. 1	E
N. H. 2	E
N. H. 3	E
NEW JERSEY	
N. J. 1	E
N. J. 2	E
N. J. 3	E
N. J. 4	E
NEW YORK	
N. Y. 1	A
N. Y. 2	E
N. Y. 3	B
N. Y. 4	E
N. Y. 5	B
N. Y. 6	
Before 1920	B
1920 and After	A
N. Y. 7	E
N. Y. 8	
Before 1920	B
1920 and After	A
N. Y. 9	
Before 1910	B
1910 and After	C
N. Y. 10	B
N. Y. 11	E
N. Y. 12	E
N. Y. 13	E
N. Y. 14	E
N. Y. 15	
Before 1900	B
1900 and After	A
N. Y. 16	E
N. Y. 17	E
N. Y. 18	C
N. Y. 19	A
N. Y. 20	A
N. Y. 21	E
N. Y. 22	E
N. Y. 23	E
N. Y. 24	E
N. Y. 25	E
N. Y. 26	E
N. Y. 27	E
N. Y. 28	E
N. Y. 29	E
N. Y. 30	E
N. Y. 31	E
N. Y. 32	E
N. Y. 33	E
N. Y. 34	E
N. Y. 35	E
N. Y. 36	E
N. Y. 37	E
N. Y. 38	E
N. Y. 39	E
N. Y. 40	E
N. Y. 41	E
N. Y. 42	E
N. Y. 43	C
N. Y. 44	E
N. CAROLINA	
N. C. 1	C
N. C. 2	E
N. C. 3	E
N. C. 4	D
N. C. 5	E
N. C. 6	E
N. DAKOTA	
N. D. 1	E
OHIO	
O. 1	
Before 1900	B
1900 and After	A
O. 2	D
O. 3	B
O. 4	E
O. 5	E
O. 6	
Before 1900	B
1900 and After	A
O. 7	E
O. 8	D
O. 9	
Before 1900	B
1900 and After	A
O. 10	E
O. 11	C
O. 11	C
O. 12	B
O. 13	E
O. 14	C
O. 15	E
O. 16	E
O. 17	E
O. 18	E
O. 19	C
O. 20	E
O. 21	E
O. 22	E
O. 23	E
O. 24	E
O. 25	B
O. 26	E
O. 27	E
O. 28	E
O. 30	E
O. 31	E
O. 32	E
O. 33	E
O. 34	E
O. 35	E
O. 36	E
O. 37	
O. 38	E
O. 39	E
O. 40	
Before 1915	B
1915 and After	A
O. 41	A
O. 42	D
OKLAHOMA	
Okla. 1	
Before 1920	C
1920 and After	B
Okla. 2	E
Okla. 3	E
Okla. 4	E
OREGON	
Ore. 1	D
Ore. 2	
Before 1915	C
1915 and After	B
1920 and After	A
PENNSYLVANIA	
Pa. 1	A
Pa. 2	A
Pa. 3	E
Pa. 4	E
Pa. 5	E
Pa. 7	E
Pa. 8	E
Pa. 9	B
Pa. 10	E
Pa. 11	A
Pa. 12	
Before 1900	B
1900 and After	A
Pa. 13	
Before 1920	C
1920 and After	E

Key	Rank
Pa. 14	E
Pa. 15	E
Pa. 16	E
Pa. 17	E
Pa. 18	E
Pa. 19	E
Pa. 20	E
PHILIPPINE IS.	
P. I. 1	E
P. I. 2	E
RHODE ISLAND	
R. I. 1	E
S. CAROLINA	
S. C. 1	
Before 1920	C
1920 and After	B
S. C. 2	E
S. C. 3	E
S. DAKOTA	
S. D. 1	E
TENNESSEE	
Tenn. 1	C
Tenn. 2	E
Tenn. 3	E
Tenn. 4	E
Tenn. 5	
Before 1900	C
1900 to 1915	B
1915 and After	A
Tenn. 6	
Before 1920	C
1920 and After	B
Tenn. 7	E
Tenn. 8	C
Tenn. 9	D
Tenn. 10	D
Tenn. 11	D
Tenn. 12	E
Tenn. 13	E
Tenn. 14	E
Tenn. 15	D
Tenn. 16	E
Tenn. 17	E
Tenn. 18	E
Tenn. 19	C
TEXAS	
Tex. 1	E
Tex. 2	
Before 1900	B
1900 and After	A
Tex. 3	C
Tex. 4	
Before 1910	D
1910 to 1915	C
1915 and After	B
Tex. 5	E
Tex. 6	C
Tex. 7	E
Tex. 8	E
Tex. 9	E
Tex. 10	E
Tex. 11	E
UTAH	
Utah 1	E
Utah 2	E
VERMONT	
Vt. 1	E
Vt. 2	B
Vt. 3	E
Vt. 5	E
Vt. 6	E
VIRGINIA	
Va. 1	
Before 1900	B
1900 and After	A
Va. 2	E
Va. 3	E
Va. 4	
Before 1915	C
1915 and After	B
Va. 5	E
Va. 6	B
WASHINGTON	
Wash. 1	E
Wash. 2	E
Wash. 3	E
WEST VIRGINIA	
W. Va. 1	E
WISCONSIN	
Wis. 1	E
Wis. 2	D
Wis. 3	C
Wis. 4	E
Wis. 5	E
Wis. 6	C
CANADA	
Alta 1	E
MANITOBA	
Man. 1	B
NOVA SCOTIA	
N. S. 1	B
ONTARIO	
Ont. 1	
Before 1900	B
1900 and After	A
Ont. 2	E
Ont. 3	B
Ont. 4	E
Ont. 5	C
Ont. 6	
Before 1920	D
1920 and After	A
QUEBEC	
Que. 1	
Before 1900	B
1900 and After	A
Que. 2	
Before 1915	D
1915 to 1920	C
1920 and After	B
Que. 3	D
Que. 4	D
Que. 5	B
Que. 6	E

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METHOD OF SELECTING MEDICAL EXAMINERS FOR THE UNION CENTRAL LIFE INSURANCE COMPANY

In towns or cities where the Company has no regular appointed examiner, refer to the Medical Directory and select a physician who is a graduate of a medical college which ranks in the best group. The medical college from which the Doctor graduated is indicated by the letters and numerals directly following his name, according to the State in which the medical college is located. The rating of this medical college is determined by referring to the key prepared by this department, arranged according to States. For example, the medical college with the symbol "N. Y. 20" is rated as Class A. The medical colleges are ranked in five classes—A, B, C, D and E. Class A is the highest rank and Class E indicates the poorest rank. When more than one rank appears after the symbol of a Medical College, the date refers to the year of graduation from the Medical College. For example: Physicians who graduated before 1900 from Cal. 2 (University of California Medical School) are ranked in Class "B"; whereas graduates in the year 1900 or after are ranked in Class "A".

Graduates of colleges rated "A" will rankin Group No. 1.
Graduates of colleges rated "B" will rank in Group No. 2.
Graduates of colleges rated "C" will rank in Group No. 3.
Graduates of colleges rated "D" will rank in Group No. 4.
Graduates of colleges rated "E" will rank in Group No. 5.

(NOTE.—The grading of medical colleges as above indicated is a purely arbitrary rating, based upon the percentage of failures each year of the representatives of the various medical schools in the United States, as the result of the examination prescribed by the State Board of Medical Examiners in each State; also upon the report of the Carnegie Foundation for the Advancement of Teaching, and the publications in the educational numbers of the Journal of the American Medical Association. This is to be utilized only for the purpose of

selecting examiners for this Company and is not intended for public distribution.)

Graduates of colleges rated "A" with hospital experience as an interne for one year after graduation in a general hospital of at least 50 beds, and who have been practicing for five years, are eligible to rank in $25,000 Group.

Graduates of colleges rated "B" with hospital experience as an interne for one year after graduation in a general hospital of at least 50 beds, are eligible to rank in Group No. 1.

Graduates of colleges rated "C" with hospital experience as an interne for one year after graduation in a general hospital of at least 50 beds, are eligible to rank in Group No. 2.

Graduates of colleges rated "D" with hospital experience as an interne for one year after graduation in a general hospital of at least 50 beds, are eligible to rank in Group No. 3.

Graduates of colleges rated "E" are not eligible to be appointed examiners for this Company and their examinations will not be accepted.

Always select a Doctor who is a graduate of a college rated Class A, if possible. If no physician with this rating is available, select the one who is graduate of a medical college in Class B, and so on.

Do not select a physician who limits his practice to any specialty other than internal medicine. Those physicians who limit their practice to any specialty are indicated by the following letters, followed by an asterisk (*); without the asterisk, it indicates that he also does a general practice besides the specialty which he is most interested in:

S.—Surgery.
Ob.—Obstetrics.
G.—Gynecology.
Or.—Orthopedic Surgery.
Pr.—Proctology.
Op.—Ophthalmology.
A.—Qtology.
LR.—Laryngology, Rhinology.

ALR.—Otology, Laryngology, Rhinology.
OALR.—Ophthalmology, Otology, Laryngology, Rhinology.
U.—Urology.
D.—Dermatology.
Pd.—Pediatrics.
N.—Neurology.
P.—Psychiatry.
R.—Roentgenology.
Path.—Pathology.
Bact.—Bacteriology.
PH.—Public Health.

Any physician whose practice is limited to Internal Medicine is eligible. Those physicians who do a general practice, in addition to practicing some specialty, are also acceptable.

Whenever possible select a physician who is between 30 and 40 years of age. If there are two physicians who will rank in the same group, one is over 50 and the second is under 30, select the doctor who is under 30 years of age in preference to the physician who is past the age 50. The age of the physician is indicated by the figures immediately following his name, given in parenthesis as follows: (b '85), which indicates that he was born in 1885.

Have the doctor forward with the first examination made by him a regular application for appointment for the position of examiner on Card 26, properly filled out and signed by him. No examination will be acted upon until this card is received at the Home Office.

Do not select any physician who is related, even remotely, to the agent or general agent.

If you have any reason to believe that the physician at any time used narcotic drugs, such as morphine, cocaine, etc., his examinations cannot be accepted; or if a physician uses alcoholic liquors to excess, he must not be employed to make any examinations. The physician selected must have a good standing in the community.

All Medical Examiners are *appointed by the Medical Direc-*

tor. General Agents and Managers may recommend to him applicants for the position. The Medical Director, however, will use his discretion in making appointments.

Medical Examiners are expected to *resign when they reach the age of* 60. No examination made by a physician 60 years of age or over will be accepted by this Department. If used to examine a risk the application will be declined and the medical examiner's fee charged to the agent.

A Medical Examiner is *appointed for his medical ability* and for no other reason. It is not necessary for him to take a policy of insurance in this company to obtain a position, or to retain it. His continuance in office depends solely upon his doing high-class medical work. If, for any reason, he becomes an agent of the company in any capacity, he is to retire as an examiner.

Physicians of exceptional ability, as proven to the satisfaction of the Medical Director, are appointed, whose *individual examination* will be *accepted for* an amount of insurance not exceeding $25,000. When such an appointment is made he is expected *to do all of the work.* Whenever his services are not available it will be necessary to give an explanation on blank No. 1614 why he was not used, and have it accompany the application for insurance. If this is not received, an amendment will be required to be signed by the agent and the $25,000 Medical Examiner. Where this $25,000 Medical Examiner is not employed, the agent uses two other examiners, the medical fee for the second examination will be charged to the agent by the Company, unless satisfactory explanation accompanies the application for insurance on blank 1614.

Ruling by the Department on Border Line Cases

If examined by a $25,000 Medical Examiner and recommended, any doubts of the risk is minimized and the application is usually approved.

If examined by a No. 1 or No. 2 Medical Examiner and recommended, the application is sometimes approved.

If examined by a No. 3 or No. 4 Medical Examiner and

recommended by him, the risk is not looked upon with favor and is generally declined, but sometimes is approved if given a first-class rating by the Inspection Department.

If examined by a No. 4 Medical Examiner, a commercial report is required in every case.

The object of this statement is to call to your attention the fact that it is a business proposition of importance for the agent to use the Medical Examiner who ranks in $25,000 group, if you have any at that location, irrespective of your personal opinion of the doctor's personality. The Examiner who ranks in highest group should be given the preference. Some States are handicapped by having a local medical school with dividends as its only standard. The result is that those States are flooded with third and fourth-grade physicians.

DR. WM. MUHLBERG, Medical Director.

DISCUSSION

Dr. Weisse—Dr. Muhlberg's paper is a difficult one to discuss as it is principally a resumé of the different methods used by the different companies in selecting their medical examiners. I do not think I have anything more to say except possibly to elaborate, for the benefit of the gentlemen present, on the method that we use.

As probably most of you know, we are the company that is referred to as the "only one that has the referee system", as we call it. By that we mean that in each of our agencies we have a medical man whom we regard as an extension of the Home Office. He has been at the Home Office, has been trained in Home Office ideas and Home Office methods, and we hold him strictly responsible for medical conditions in his territory.

He picks out the examiners from his personal knowledge of them, in most instances, and recommends them to the Home Office and we act on his recommendation, unless we have something on file against the man of which the Referee is not aware. He does this by correspondence, by Retail Credit reports, and,

if necessary, by calling on the Inspector who is assigned to that territory.

So much for picking out our Examiners. Dr. Muhlberg refers to the difficulty of keeping track of the Examiners after they are picked out. Well, we expect our Referees to do that to a large extent and, furthermore, we have our business inspected regularly, as most of the larger companies have. We have a Home Office salaried Inspector, a lay Inspector, who inspects risks at least once in two years, and usually every year goes through his territory, and he reports to the Home Office on each Examiner in his territory. So every year, or at least every second year, we have a report regarding any examiner from a thoroughly competent Inspector. If this report is adverse, we refer it to the Referee to check up. We do not always take a layman's statement about a doctor, because sometimes they are apt to be prejudiced, but we feel that we get as near, I won't say perfection, but as near satisfactory conditions in the selection of Examiners as can be gotten, unless we keep a Medical Inspector travelling around constantly and doing nothing else.

Dr. Fisher—I would like to ask Dr. Weisse how he compensates his Referees.

Dr. Weisse—By salary, in addition to fees as "first call" in the city in which he is located.

Dr. Turner—It is with much pleasure that I have read and studied Dr. Muhlberg's excellent paper, and I wish to say that the Doctor has given us a good foundation upon which we may stand to begin the selection of medical examiners, with many valuable hints as to how to continue to check our examiners after they are appointed, but should you use his method of selection and stop there you will fall short of your duty. I take it that the Doctor would keep close check on all his examiners whether they be from the best schools or not, and that the grade of work performed by them would have much to do with whether he would continue their use as examiners.

After you have gotten the school, grade, Retail report, and all other information available from whatever source, and the

man is appointed, it is my humble opinion that you are not more than half through with the selection of an examiner. In my judgment the work of checking the examiner's work is the big half of the work of appointment since if his work is unsatisfactory, he must be discontinued or put in a lower grade. You may grade your examiners' cards in any way you may see fit, but do it in as simple a way as possible, and don't make too many divisions. I would suggest the A, B, C, D, E, school grades, and the 1, 2, 3, 4, as suggested by Dr. Muhlberg, the A, B, C, D, E and 1, 2, 3, 4, indicating the man's educational qualifications, and then some other numeral to indicate the grade of work actually being done, taking ten for the best work and so on down from ten until you have reached a point where you do not want to accept the work of the examiner. To illustrate A1, 9 would indicate that the doctor graduated from an A college, that he did not serve as interne and that his work had been 90% perfect. I would also suggest some other code impairments to keep tab on habits, etc., and all of these may be placed on a small card along with the doctor's name and address.

It is a fact that many physicians well qualified in every respect to make examinations for life insurance are complete failures as examiners since they seem only interested in the fee they are to receive and fail to enter into the real vital reasons for the examination. This class should be discontinued as soon as you can get one who has the proper appreciation of the importance of a painstaking examination, one who spares no time or effort to investigate and fully develop all and the exact facts in each case, keeps in mind always that he is employed and paid by the company for the service and not by the applicant or agent. This type is the best and is to be cherished as a valuable jewel.

Dr. Fisher—In the Northwestern we have a guide card. We keep all vouchers until the doctor is paid. On the guide card we record the causes of death in the cases examined by the doctor, the length of time on the books of the Company, etc., and it gives us an idea of the character of the work of the

examiner. We also have a card on which we record the results of any investigations that have been made. We keep something in the nature of a ledger account which indicates to us whether or not a man understands just what a life insurance examination means. If he has taken a Post-Graduate course we make a note of that on his card. In fact all the information that comes to us concerning an examiner, favorable or unfavorable, is placed on that card, so that with this information before us we can determine whether he is a man that we ought to discontinue or whether he is the type of Examiner that we wish to employ. We keep on file all correspondence relating to the appointment of Medical Examiners. These appointments are all made from the Home Office. If an agent recommends an examiner, that is of course taken into account, but we usually make our appointments upon the recommendation of examiners located in and around a town in which the doctor resides. We judge, too, by the college from which the man graduated, and the number of recommendations that we receive. Of course in large cities that doesn't work as well. We do not, however, have an inspector travelling around, especially to interview Examiners. There is of course more or less travelling among our Home Office doctors and whenever they visit a town they endeavor to see the doctor who is our examiner and explain to him our side of the question. We always record on the Examiner's card that such a visit has been made and the impression which the examining doctor received.

Dr. Strathy—One naturally turns to one's own district to see how a scheme works there. I notice that there are six colleges listed in the province from which I come—Ontario. As a matter of fact there are at the present time only three medical colleges in Ontario. I don't know what colleges are listed, but I see that two of them are listed as "E". Apparently the extra colleges are those which have since amalgamated with the other colleges. I have personal knowledge of those colleges, and they were amalgamated about fifteen years ago. The graduates of those colleges were equal to graduates of any of

the other colleges at the time they disappeared. They would not of course be first-class colleges today by any means, but the men from those colleges are supplying a lot of teachers in our present colleges, and it seems to me if you use this standard to judge the abilities of these men you are going to get a very wrong standard.

The method which appeals to us in opening up new fields is to write to the head office of a company which is doing a large amount of business in those fields and get from them the result of their experience with the examiners of that district. If there are any companies opening up any new offices in any of the Canadian provinces I think we could give them very valuable information as to what examiners to select.

Dr. Muhlberg (closing)—The object of my paper was rather to discuss the question of the selection of new examiners than the study of those examiners after they have been selected. We study the work of the examiner very carefully, keeping track of death losses and of any poor work he does, and if we find that his work is better than the rank we have given him, we rate him up, or vice versa. But the idea is to solve the problem of appointing an examiner practically on the spur of the moment in some little town, say down in Louisiana, where you can't possibly get any idea of what the character of the doctors in that town may be.

So far as the rating is concerned, you must remember that we have rated some four or five hundred colleges, most of which are now extinct. We simply give the rating of those colleges while they were in existence, which doesn't however affect a graduate from the school with which that college is fused. As a matter of fact, the colleges in the United States today are either very good or very bad. The colleges that remain have either gone up and become splendid schools or they have gone down and cater to the poorest element among the medical students.

In my opinion there ought to be some sort of an interchange with reference to examiners. I believe that Dr. Weisse's plan is the best for appointing examiners. I believe the best way

would be to have a corps of paid medical inspectors in the field constantly scattered throughout the United States, but that of course is a very expensive thing. A small middle-west company cannot afford to keep paid inspectors in the field and such inspectors must be paid well. The only thing we could do is to collaborate in the matter, fifty or one hundred companies could get together and appoint medical inspectors and put them in the field. Such a plan would distribute the expense pro-rata amongst the various companies. The hitch to a scheme of that sort is that the older companies have a well-established corps of medical examiners and they are very well satisfied with their corps of examiners—sometimes I think they are too well satisfied—but these men have examined for these larger companies for a number of years, and undoubtedly their experience is satisfactory. But I really believe if we collaborated it would be to our mutual advantage. I believe the A. L. C. has some such plan under consideration, and a committee has been appointed for this purpose. The older companies will not gain very much because they have a well organized corps of medical examiners, and if they entered into such an arrangement their pro rata would necessarily be high and the benefit rather meagre, but the middle sized and small companies would gain a great deal from such a bureau, and I believe it would well warrant the cost.

I have also found that there is a tremendous difference in the character of the students that go to colleges of different grades. The men who go to the better schools are chiefly college men, bright, alert and strong characters, just the type that an unscrupulous agent wouldn't dare tamper with. On the other hand, in the poorer colleges the material is different—made up largely of men who cannot afford to go to the better schools, or who cannot pass the entrance examinations for the better schools, but also made up partly of men who want to get their diplomas and get out and make money. They don't care for interneships. To my mind the most dangerous examiner we have is the avaricious examiner who wants to make money. He will play the agent's game at any time.

We have tried for years to appoint doctors through the recommendation of agents, but we found it didn't work. But our present method has worked for twelve years very nicely indeed. It isn't infallible but it has many advantages. It is strictly automatic. The agent can go into a town where we have no examiner and automatically pick out a doctor. We, of course, check his choice at the Home Office. Altogether the scheme has worked out very nicely indeed. But I do believe that the system of the Medical Referee or travelling Medical Inspector is the best plan; the principal drawback being the expense.

Dr. Hobbs—I beg leave, Mr. President, to present the following resolution:

RESOLVED—That we extend to President Butler and other officers of the Travelers Insurance Company our thanks and deep appreciation of the courtesy and hospitality shown us during the meeting just now closing; also that we extend to the members of the office force of the Travelers a vote of thanks for the fine entertainment which they provided on the occasion of our Annual Dinner.

Dr. Porter seconded the motion, and it was carried.

Dr. Porter moved and Dr. Hobbs seconded, that we also extend a hearty vote of thanks to the Entertainment Committee and to the members of the fraternity in Hartford for the delightful way in which the Association has been entertained. The meeting has been most successful and they are to be congratulated upon the results.

Dr. Grosvenor—Gentlemen, I desire to say that whatever measure of success this meeting has obtained I feel is due entirely to the gentlemen who have collaborated with me in preparing papers and to those

who have so ably discussed the papers. I thank them all heartily, and I thank every member of the Association who has attended this meeting for his cooperation. I assure you that while the preparation for a meeting of this sort involves considerable work, it has given me a great deal of pleasure. At the same time I confess that it is with a sense of relief that I turn the Presidency over to the incoming President, Dr. William R. Ward, whom I have pleasure in introducing to you. Will Dr. Ward say a word or two?

Dr. Ward—Mr. President and Gentlemen—I did not anticipate this privilege. I do appreciate more than I can say the honor which this Association has conferred upon me. When I think of the character and the type of men who have preceded me in this office, I must admit that I stand rather aghast, for I realize the standard that they have set and how difficult it is going to be to measure up to the requirements of that standard. I do assure you, fellow members of this Association that I appreciate what you have done, and I hope we may see not only all the men who are here but a great many who have not been here in Newark in 1924. We have an interesting city. We have not only the Prudential but the Mutual Benefit, and we work side by side, and I know I bespeak not only for my confreres in the Mutual Benefit but for all my good friends in the Prudential a most cordial welcome to all who will come. We will try and prepare as helpful and as attractive a program as my good friend, Dr. Grosvenor, has given us and I set before me in saying that a very high standard indeed. I hope to welcome you all next year.

On motion the meeting adjourned sine die.

The Annual Dinner of the Association of Life Insurance Medical Directors of America was held at the Hartford Club, Hartford, Conn., on Thursday evening, October 18th, 1923. The following members and guests were present:

John W. Abbot, C. D. Alton, J. W. Amesse, T. D. Archibald, H. A. Baker, A. W. Balch, Wm. B. Bartlett, J. T. J. Battle, C. C. Beach, W. W. Beckett, Edward B. Bigelow, W. F. Blackford, David N. Blakely, Chester T. Brown, C. C. Birchard, T. W. Burrows, Stanley R. Benedict, Jos. T. Cabaniss, Laurence D. Chapin, C. L. Christiernin, Henry Colt, G. E. Crawford, R. M. Daley, W. E. Dickerman, Henry Dillard, Wm. W. Dinsmore, P. G. Drake, Louis I. Dublin, O. M. Eakins, Z. H. Ellis, C. H. English, W. G. Exton, Harold Frost, Otto H. Folin, S. W. Gadd, A. H. Gordon, Le Roy C. Grau, Wm. W. Graves, A. H. Griswold, F. L. Grosvenor, Geo. C. Hall, Jos. B. Hall, W. F. Hamilton, Whitfield Harral, Angier B. Hobbs, H. S. Hutchinson, W. G. Hutchinson, Ross Huston, F. L. Hoffman, Chas. B. Irwin, W. A. Jaquith, B. Y. Jaudon, F. L. B. Jenney, A. E. Johann, Francis M. Kingsbury, A. S. Knight, W. W. Knight, John M. Little, R. L. Lounsberry, M. M. Lairy, J. M. Livingston, T. F. McMahon, W. F. Milroy, Wm. D. Morgan, Wm. Muhlberg, Chas. N. McCloud, Henry A. Martelle, Chas. F. Martin, J. R. Neal, Geo. Parker, J. Allen Patton, J. S. Phelps, Chas. B. Piper, Jos. E. Pollard, W. Evelyn Porter, Jas. T. Priestly, Frank P. Righter, Oscar H. Rogers, Robt. L. Rowley, Walter

A. Reiter, Fred. W. Rolph, S. B. Scholz, Jr., Morton Snow, Marion Souchon, S. C. Stanton, H. F. Starr, J. B. Steele, G. S. Strathy, Carl Stutsman, Frank L. Truitt, J. P. Turner, Euen Van Kleeck, Wm. R. Ward, Wm. H. Wehner, Faneuil S. Weisse, E. A. Wells, Fred L. Wells, C. F. S. Whitney, Thos. H. Willard, M. C. Wilson, Glenn Wood, H. H. Young.

LIST OF MEMBERS OF THE ASSOCIATION OF LIFE INSURANCE MEDICAL DIRECTORS

Frederick R. Abbe, M.D.	Columbian National, Boston, Mass.
John L. Adams, M.D.	Metropolitan, New York, N. Y.
Edwin H. Allen, M.D.	John Hancock, Boston, Mass.
Charles D. Alton, M.D.	Connecticut Mutual, Hartford, Conn.
John W. Amesse, M.D.	Capitol Life of Colorado, Denver, Colo.
Harry B. Anderson, M.D.	Imperial Life, Toronto, Ont.
Thomas D. Archibald, M.D.	North American, Toronto, Ont.
Edward McP. Armstrong, M.D.	Mutual, New York, N. Y.
William Armstrong, M.D.	Connecticut General, Hartford, Conn.
William B. Aten, M.D.	Security Mutual, Binghamton, N. Y.
Malcolm O. Austin, M.D.	West Coast, San Francisco, Cal.
Henry A. Baker, M.D.	Kansas City Life, Kansas City, Mo.
Alfred W. Balch, M.D.	Metropolitan, New York, N. Y.
G. Holbrook Barber, M.D.	Manhattan, New York, N. Y.
William B. Bartlett, M.D.	John Hancock, Boston, Mass.

John T. J. Battle, M.D.	Jefferson Standard, Greensboro, N. C.
Wesley W Beckett, M.D.	Pacific Mutual, Los Angeles, Cal.
Charles D. Bennett, M.D.	Mutual Benefit, Newark, N. J.
Thomas W. Bickerton, M.D.	New York Life, New York, N. Y.
Edward B. Bigelow, M.D.	State Mutual, Worcester, Mass.
Albert W. Billing, M.D.	Equitable, New York, N. Y.
Cecil C. Birchard, M.D.	Sun Life, Montreal, Quebec.
Arthur B. Bisbee, M.D.	National, Montpelier, Vt.
David N. Blakely, M.D.	New England Mutual, Boston, Mass.
Robert J. Blanchard, M.D.	Great West, Winnipeg, Manitoba.
William M. Bradshaw, M.D.	Mutual, New York, N. Y.
Frederick G. Brathwaite, M.D.	Equitable, New York, N. Y.
Chester T. Brown, M.D.	Prudential, Newark, N. J.
William H. Browne, M.D.	American Life, Detroit, Mich.
Chauncey R. Burr, M.D.	Metropolitan Life, New York, N. Y.
Thomas W. Burrows, M.D.	Central Life, Ottawa, Ill.
Joseph T. Cabaniss, M.D.	Travelers, Hartford, Conn.
Frank H. Carber, M.D.	Mutual, New York, N. Y.
Elbridge A. Carpenter, M.D.	Penn Mutual, Philadelphia, Pa.
Frank W. Chapin, M.D.	Home Life, New York, N. Y.
Laurence D. Chapin, M.D.	Massachusetts Mutual, Springfield, Mass.
John P. Chapman, M.D.	Penn Mutual, Philadelphia, Pa.
Charles L. Christiernin, M.D.	Metropolitan, New York, N. Y.
Charles P. Clark, M.D.	Mutual Benefit, Newark, N. J.

Henry Colt, M.D.	Berkshire, Pittsfield, Mass.
Edwin A. Colton, M.D.	National, Montpelier, Vt.
Henry W. Cook, M.D.	Northwestern National, Minneapolis, Minn.
John N. Coolidge, M.D.	Metropolitan, New York, N. Y.
Robert M. Daley, M.D.	Equitable, New York, N. Y.
Edwin Grafing Dewis, M.D.	Prudential, Newark, N. J.
Wilton E. Dickerman, M.D.	Aetna, Hartford, Conn.
Henry K. Dillard, M.D.	Penn Mutual, Philadelphia, Pa.
William W. Dinsmore, M.D.	Travelers, Hartford, Conn.
Percy G. Drake, M.D.	Travelers, Hartford, Conn.
Edwin W. Dwight, M.D.	New England Mutual, Boston, Mass.
O. M. Eakins, M.D.	Reliance, Pittsburgh, Pa.
Zenas H. Ellis, M.D.	Connecticut General, Hartford, Conn.
Z. Taylor Emery, M.D.	Manhattan, New York, N. Y.
Calvin H. English, M.D.	Lincoln National, Ft. Wayne, Ind.
William G. Exton, M.D.	Prudential, Newark, N. J.
John Ferguson, M.D.	Excelsior, Toronto, Ont.
John W. Fisher, M.D.	Northwestern Mutual, Milwaukee, Wis.
Paul Fitzgerald, M.D.	Prudential, Newark, N. J.
Robert A. Fraser, M.D.	New York Life, New York, N. Y.
Dudley Fulton, M.D.	Occidental Life, Los Angeles, Cal.
Samuel W. Gadd, M.D.	Philadelphia Life, Philadelphia, Pa.
Homer Gage, M.D.	State Mutual, Worcester, Mass.
Frank Irving Ganot, M.D.	Prudential, Newark, N. J.
William S. Gardner, M.D.	Mutual Life, New York, N. Y.

Donald M. Gedge, M.D.	Metropolitan, New York, N. Y.
Arthur Geiringer, M.D.	Equitable, New York, N. Y.
Alvah H. Gordon, M.D.	London & Scottish, Montreal, Que.
Angus Graham, M.D.	London Life, London, Ont.
LeRoy C. Grau	Travelers, Hartford, Conn.
Arthur H. Griswold, M.D.	Phoenix Mutual, Hartford, Conn.
Frank L. Grosvenor, M.D.	Travelers, Hartford, Conn.
Ignatius Haines, M.D.	John Hancock, Boston, Mass.
George C. Hall, M.D.	Life Ins. Co. of Virginia, Richmond, Va.
Joseph B. Hall, M.D.	Connecticut Mutual, Hartford, Conn.
William F. Hamilton, M.D.	Sun Life, Montreal, Que.
William J. Hammer, M.D.	New York Life, New York, N. Y.
George A. Harlow, M.D.	Northwestern Mutual, Milwaukee, Wis.
Whitfield Harral, M.D.	Southwestern Life, Dallas, Texas
Calvin L. Harrison, M.D.	New York Life, New York, N. Y.
Ernest M. Henderson, M. D.	Confederation Life, Toronto, Ont.
Charles R. Henry, M.D.	State Life, Indianapolis, Ind.
John U. Hobach, M.D.	Penn Mutual, Philadelphia, Pa.
Angier B. Hobbs, M.D.	New York Life, New York, N. Y.
W. W. Hobson, M.D.	Reliance Life, Pittsburgh, Pa.
Eugene M. Holden, M.D.	Metropolitan Life, New York, N. Y.
Jerome F. Honsberger, M.D.	Mutual Life of Canada, Waterloo, Ont.
Ross Huston, M.D.	Bankers, Des Moines, Ia.

Henry S. Hutchison, M.D.	Canada Life, Toronto, Ont.
James P. Hutchinson, M.D.	Penn Mutual, Philadelphia, Pa.
William G. Hutchinson, M.D.	Michigan Mutual, Detroit, Mich.
Lefferts Hutton, M.D.	Mutual Life, New York, N. Y.
Phineas H. Ingalls, M.D.	Aetna Life, Hartford, Conn.
Charles B. Irwin, M.D.	North American, Chicago, Ill.
Walter A. Jaquith, M.D.	National, Chicago, Ill.
Benjamin Y. Jaudon, M.D.	Missouri State Life, St. Louis, Mo.
Frank L. B. Jenney, M.D.	Federal Life, Chicago, Ill.
Albert O. Jimenis, M.D.	Metropolitan, New York, N. Y.
Albert E. Johann, M.D.	Bankers, Des Moines, Ia.
George E. Kanouse, M.D.	Prudential, Newark, N. J.
Edward B. Kellogg, M.D.	John Hancock, Boston, Mass.
Morris L. King, M.D.	New York Life, New York, N. Y.
Robert J. Kissock, M.D.	Metropolitan, New York, N. Y.
Augustus S. Knight, M.D.	Metropolitan, New York, N. Y.
William P. Lamb, M.D.	Prudential, Newark, N. J.
John L. Larway, M.D.	State Life of Indiana, Indianapolis, Ind.
Ernest H. Lines, M.D.	New York Life, New York, N. Y.
John Mason Little, M.D.	New England Mutual, Boston, Mass.
John M. Livingston, M.D.	Mutual Life of Canada, Waterloo, Ont.
Robert L. Lounsberry, M.D.	Security Mutual, Binghamton, N. Y.
Lewis F. MacKenzie, M.D.	Prudential, Newark, N. J.
Charles N. McCloud, M.D.	Minnesota Mutual, St. Paul, Minn.

Carleton B. McCulloch, M.D.	State Life, Indianapolis, Ind.
Thomas F. McMahon, M.D.	Manufacturers, Toronto, Ont.
Charles Maertz, M.D.	Union Central, Cincinnati, O.
Robert W. Mann, M.D.	Imperial, Toronto, Ont.
William S. Manners, M.D.	Metropolitan, New York, N. Y.
Henry A. Martelle, M.D.	Connecticut Mutual, Hartford, Conn.
Charles F. Martin, M.D.	Standard Life, Montreal, Que.
Oscar F. Maxon, M.D.	Franklin Life, Springfield, Ill.
Paul Mazzuri, M.D.	New York Life, New York, N. Y.
Samuel W. Means, M.D.	Metropolitan, New York, N. Y.
John C. Medd, M.D.	Metropolitan, New York, N. Y.
George L. Megargee, M.D.	Metropolitan, New York, N. Y.
Archibald Mercer, M.D.	Mutual Benefit, Newark, N. J.
William F. Milroy, M.D.	Bankers Reserve, Omaha, Neb.
James T. Montgomery, M.D.	Southland, Dallas, Texas
William D. Morgan, M.D.	Phoenix Mutual, Hartford, Conn.
William Muhlberg, M.D.	Union Central, Cincinnati, Ohio
John P. Munn, M.D.	United States, New York, N. Y.
James H. North, M.D.	New York Life, New York, N. Y.
Edwin M. Northcott, M.D.	Union Mutual, Portland, Me.
Ralph B. Ober, M.D.	Massachusetts Mutual, Springfield, Mass.
Jay Bergen Ogden, M.D.	Metropolitan, New York, N. Y.
Herbert Old, M.D.	Provident Life & Trust, Philadephia, Pa.

Martin I. Olsen, M.D.	Central Life, Des Moines, Iowa
Brace W. Paddock, M.D.	Berkshire Life, Pittsfield, Mass.
Howard A. Pardee, M.D.	United States Life, New York, N. Y.
George W. Parker, M.D.	Peoria Life, Peoria, Ill.
J. Allen Patton, M.D.	Prudential, Newark, N. J.
William O. Pauli, M.D.	Union Central, Cincinnati, O.
Harry S. Pearse, M.D.	Equitable, New York, N. Y.
William A. Paterson, M.D.	Mutual Trust, Chicago, Ill.
John S. Phelps, M.D.	Columbian National, Boston, Mass.
Charles B. Piper, M.D.	Guardian Life, New York, N. Y.
Joseph E. Pollard, M.D.	Prudential, Newark, N. J.
William Evelyn Porter, M.D.	Mutual, New York, N. Y.
Albert T. Rost, M.D.	Equitable, New York, N. Y.
James T. Priestley, M.D.	Royal Union Mutual, Des Moines, Iowa
Walter A. Reiter, M.D.	Mutual Benefit, Newark, N. J.
Frank P. Righter, M.D.	Atlantic Life, Richmond, Va.
William B. Robbins, M.D.	New England Mutual, Boston, Mass.
Thomas H. Rockwell, M.D.	Equitable Life, New York, N. Y.
Oscar H. Rogers, M.D.	New York Life, New York, N. Y.
Fred W. Rolph, M.D.	Confederation, Toronto, Ont.
Edward K. Root, M.D.	Aetna, Hartford, Conn.
Robert L. Rowley, M.D.	Phoenix Mutual, Hartford, Conn.
Eugene F. Russell, M.D.	Mutual, New York, N. Y.
H. Crawford Scadding, M.D.	Canada Life, Toronto, Ont.
Samuel B. Scholz, Jr., M.D.	Massachusetts Mutual, Springfield, Mass.
Henry H. Schroeder, M.D.	Mutual, New York, N. Y.

Arthur L. Sherrill, M.D.	Equitable, New York, N. Y.
Daniel M. Shewbrooks, M.D.	Lincoln National, Fort Wayne, Ind.
Donald W. Skeels, M.D.	Occidental, Los Angeles, Cal.
James M. Smith, M.D.	American Central, Indianapolis, Ind.
Malcolm K. Smith, M.D.	Prudential, Newark, N. J.
Morton Snow, M.D.	Massachusetts Mutual, Springfield, Mass.
Marion Souchon, M.D.	Pan-American, New Orleans, La.
Howard B. Speer, M.D.	Metropolitan, New York, N. Y.
Henry F. Starr, M.D.	Southern Life & Trust, Greensboro, N C.
John B. Steele, M.D.	Volunteer State Life, Chattanooga, Tenn.
George S. Strathy, M.D.	Canada Life, Toronto, Ont.
Lawrence C. Sykes, M.D.	Northwestern Mutual, Milwaukee, Wis.
Brandreth Symonds, M.D.	Mutual Life, New York, N. Y.
William Thorndike, M.D.	Northwestern Mutual, Milwaukee, Wis.
Walter E. Thorton, M.D.	Lincoln National, Fort Wayne, Ind.
Paul E. Tiemann, M.D.	New York Life, New York, N. Y.
Harry Toulmin, M.D.	Penn Mutual, Philadelphia, Pa.
Frank L. Truitt, M.D.	Reserve Loan, Indianapolis, Ind.
John S. Turner, M.D.	Southland, Dallas, Texas
Joseph P. Turner, M.D.	Jefferson Standard, Greensboro, N. C.

Henry G. Tuttle, M.D.	Metropolitan, New York, N. Y.
Charles A. Van Dervoort, M.D.	Fidelity Mutual, Philadelphia, Pa.
Euen Van Kleeck, M.D.	Travelers, Hartford, Conn.
George A. Van Wagenen, M.D.	Mutual Benefit, Newark, N. J.
A. A. Wagner, M.D.	Reliance Life, Pittsburgh, Pa.
Charles E. Waits, M.D.	Southern States, Atlanta, Ga.
William R. Ward, M.D.	Mutual Benefit, Newark, N. J.
William Perry Watson, M.D.	Prudential, Newark, N. J.
William H. E. Wehner, M.D.	Fidelity Mutual, Philadelphia, Pa.
Faneuil S. Weisse, M.D.	Mutual, New York, N. Y.
Ernest A. Wells, M.D.	Aetna, Hartford, Conn.
Franklin C. Wells, M.D.	Equitable, New York, N. Y.
Fred L. Wells, M.D.	Equitable of Iowa, Des Moines, Iowa
David E. W. Wenstrand, M.D.	Northwestern Mutual, Milwaukee, Wis.
Charles D. Wheeler, M.D.	State Mutual, Worcester, Mass.
Chester F. S. Whitney, M.D.	Home Life, New York, N. Y.
Thomas H. Willard, M.D.	Metropolitan, New York, N. Y.
Richard Lee Willis, M.D.	Mutual, New York, N. Y.
Charles H. Willits, M.D.	Provident Mutual, Philadelphia, Pa.
Gordon Wilson, M.D.	Maryland Life, Baltimore, Md.
McLeod C. Wilson, M.D.	Travelers, Hartford, Conn.
Harry P. Woley, M.D.	New York Life, New York, N. Y.
Glenn Wood, M.D.	Illinois Life, Chicago, Ill.

HONORARY MEMBERS

John W. Brannan, M.D.	New York, N. Y.
John K. Gore, M.D.	Newark, N. J.
Arthur Hunter, M.D.	New York, N. Y.
Thomas Glover Lyon, M.D.	London, England
Edward E. Rhodes	Newark, N. J.
Archibald A. Welch, M.D.	Hartford, Conn.
Granville M. White, M.D.	New York, N. Y.

LIST OF COMPANIES AND THEIR REPRESENTATIVES

Ætna Life, Hartford, Conn.	W. E. Dickerman, M.D. P. H. Ingalls, M.D. E. K. Root, M.D. E. A. Wells M.D.
American Central Life, Indianapolis, Ind.	J. M. Smith, M.D.
American Life, Detroit, Mich.	W. H. Browne, M.D.
Atlantic Life, Richmond, Va.	F. P. Righter, M.D.
Bankers Life Co., Des Moines, Iowa	Ross Huston, M.D. Albert E. Johann, M.D.
Bankers Reserve Life, Omaha, Nebr.	Wm. F. Milroy, M.D.
Berkshire Life, Pittsfield, Mass.	Henry Colt, M.D. B. W. Paddock, M.D.
Canada Life Assurance Co., Toronto, Ont., Can.	Henry S. Hutchison, M.D. H. C. Scadding, M.D. G. S. Strathy, M.D.
Capitol Life of Colorado, Denver, Colo.	John W. Amesse, M.D.

Central Life of Des Moines, Des Moines, Iowa	M. I. Olsen, M.D.
Central Life of Ill., Ottawa, Ill.	Thomas W. Burrows, M.D.
Columbian National Life, Boston, Mass.	F. R. Abbe, M.D. J. S. Phelps, M.D.
Confederation Life Association, Toronto, Ont., Can.	E. M. Henderson, M.D. Fred W. Rolph, M.D.
Connecticut General Life, Hartford, Conn.	William Armstrong, M.D. Zenas H. Ellis, M.D.
Connecticut Mutual Life, Hartford, Conn.	C. D. Alton, M.D. J. B. Hall, M.D. H. A. Martelle, M.D.
Equitable Life, Assur. Soc., New York, N. Y.	A. W. Billings, M.D. F. G. Brathwaite, M.D. R. M. Daley Arthur Geiringer, M.D. Harry S. Pearse, M.D. A. T. Post, M.D. T. H. Rockwell, M.D. A. H. Sherrill, M.D. F. C. Wells, M.D.
Equitable Life of Iowa, Des Moines, Iowa	F. L. Wells, M.D.
Excelsior Life, Toronto, Ont., Can.	John Ferguson, M.D.
Fidelity Mutual Life, Chicago, Ill.	Frank L. B. Jenney, M.D.

Jefferson Standard Life, Philadelphia, Pa.	C. A. Van Dervoort, M.D. W. H. E. Wehner, M.D.
Franklin Life, Springfield, Ill.	O. F. Maxon, M.D.
Guardian Life, New York, N. Y.	C. B. Piper, M.D.
Great West Life Assur. Co., Winnipeg, Man., Can.	R. J. Blanchard, M.D.
Home Life, New York, N. Y.	F. W. Chapin, M.D. C. F. S. Whitney, M.D.
Illinois Life, Chicago, Ill.	Glenn Wood, M.D.
Imperial Life Assur. Co., Toronto, Ont., Can.	H. B. Anderson, M.D. Robert W. Mann, M.D.
Jefferson Standard Life, Greensboro, N. C.	J. T. J. Battle, M.D. J. P. Turner, M.D.
John Hancock Mutual Life, Boston, Mass.	E. H. Allen, M.D. W. B. Bartlett, M.D. E. B. Kellogg, M.D. I. Haines, M.D.
Kansas City Life, Kansas City, Mo.	Henry A. Baker, M.D.
Life Ins. Co. of Virginia, Richmond, Va.	G. C. Hall, M.D.
Lincoln National Life, Fort Wayne, Indiana	C. H. English, M.D. D. M. Shewbrooks, M.D. W. E. Thornton, M.D.

London & Scot. Assur. Assn., Ltd Montreal, Que., Can.	A. H. Gordon, M.D.
London Life, London, Ont., Can.	Angus Graham, M.D.
Manhattan Life, New York, N. Y.	G. Holbrook Barber, M.D. Z. Taylor Emery, M.D.
Manufacturers Life, Toronto, Ont., Can.	T. F. McMahon, M.D.
Maryland Life, Baltimore, Md.	Gordon Wilson, M.D.
Massachusetts Mutual Life, Springfield, Mass.	L. D. Chapin, M.D. R. B. Ober, M.D. S. B. Scholz, Jr., M.D. Morton Snow, M.D.
Metropolitan Life, New York, N. Y.	J. L. Adams, M.D. A. W. Balch, M.D. C. R. Burr, M.D. C. L. Christiernin, M.D. J. N. Coolidge, M.D. D. M. Gedge, M.D. E. M. Holden, M.D. A. O. Jimenis, M.D. R. J. Kissock, M.D. A. S. Knight, M.D. W. S. Manners, M.D. S. W Means, M.D. J. C. Medd, M.D. G. L. Megargee, M.D. J. B. Ogden, M.D.
Michigan Mutual Life, Detroit, Mich.	H. B. Speer, M.D. H. G. Tuttle, M.D. T. H. Willard, M.D.

Minnesota Mutual Life, St. Paul, Minn.	W. G. Hutchinson, M.D.
Minnesota, State Life, St. Paul Minn.	C. N. McCloud, M.D.
Missouri Mutual Life, St. Louis, Mo.	B. Y. Jaudon, M.D.
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Occidental Life, Los Angeles, Cal.	Dudley Fulton, M.D. D. W. Skeels, M.D.

Pacific Mutual Life, Los Angeles, Cal.	W. W. Beckett, M.D.
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Union Mutual Life, Portland, Me.	E. M. Northcott, M.D.
United States Life, New York, N. Y.	J. P. Munn, M.D. H. A. Pardee, M.D.
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James Campbell, M.D.	Hartford, Conn.
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Edward Curtis, M.D.	New York, N. Y.
Clark W. Davis, M.D.	Cincinnati, Ohio
William B. Davis, M.D.	Cincinnati, Ohio
Charles A. Devendorf, M.D.	Detroit, Mich.
Frank Donaldson, M.D.	Baltimore, Md.
Thomas A. Foster, M.D.	Portland, Me.
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Frank S. Grant, M.D.	New York, N. Y.
Landon Carter Gray, M.D.	New York, N. Y.
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John Homans, 2nd, M.D.	Boston, Mass.
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Melancthon Storrs, M.D.	Hartford, Conn
H. Cabell Tabb, M.D.	Richmond, Va.
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G. E. Crawford, M.D.	Cedar Rapids Life Insurance Co., Cedar Rapids, Ia.
Robert J. Grayes, M.D.	United Life & Accident Insurance Co., Concord, N. H.
M. M. Lairy, M.D.	Lafayette Life Insurance Co., Lafayette, Ind.
John R. Neal, M.D.	Mutual Life of Illinois, Springfield, Ill.
C. E. Schilling, M.D.	Ohio State Life Insurance Co., Columbus, O.
S. C. Stanton, M.D.	Farmers National Life Insurance Co. of America, Chicago, Ill.
Carl Stutsman, M.D.	Merchants Life Insurance Co., Des Moines, Ia.

INDEX

Age Incidence of Scapular Types, Its Possible Relation to Longevity, William W. Graves, M.D. Discussion by Drs. Dublin, Hoffman, Patton and Rogers, 60

Amendment to Article III of the Constitution, 39

Amendment to Article VIII of the Constitution, 38

Anthropometrical Supplement to Report of Committee on Dreyer's Work, Dr. Louis I. Dublin, 162

Benedict, S. R., M.D., Metropolitan Laboratories, 111

Committee on Blood Pressure, 35

Committee on Medical Examination Blanks, 36

Committee on Public Health, 36

Committee on Revision of the Constitution and By-Laws, 38

Committee to make a Survey of the Medical Examiner Situtation, 43

Committee to Study Dreyer's Work in Relation to Life Insurance, 147

Dublin, Dr. Louis I., Anthropometrical Supplement to Report of Committee on Dreyer's Work, 162

Eakin, O. M., M.D., Medical Directors, 128

Election of honorary members, 42

Election of new members, 3

Election of Officers, 34

Experience of Certain Border-Line Classification, Dr. F. L. Grosvenor, 6

Exton, William G., M.D., Prudential Longevity Service, 244

Folin, O. H., Metropolitan Laboratories, 111

Frost, Harold M., M.D., Report on Progress of the Application of the Cardio-Respiratory Test, 232

Glycosuria, Its Importance in Life Insurance Selection, Ross Huston, M.D. Discussion by Drs. Truitt, McCloud, Strathy, Daley, Exton, Muhlberg and Brown, 205

Graves, Dr. William W., Age Incidence of Scapular Types, Its Possible Relation to Longevity, 60

Grosvenor, F. L., M.D., Experience on Certain Border-Line Classifications, 6

Huston, Dr. Ross, Glycosuria, Its Importance in Life Insurance Selection, 205

Martin, Dr. C. F., Pleurisy in Relation to Life Insurance, 182

Medical Directors, O. M. Eakins, M.D. Discussion by Drs. Willard, Symonds and Fisher, 128

Memorandum, J. W. Fisher, M.D., 40

Metropolitan Laboratories, Dr. S. R. Benedict and Dr. O. H. Folin. Discussion by Drs. Exton and Balch, 111

Mortality Study of Impaired Lives, Dr. Oscar H. Rogers and Mr. Arthur Hunter. Discussion by Drs. Brown, Hamilton, Knight and Fisher, 43

Muhlberg, William, M.D., Selection of Medical Examiners for Life Insurance, 260

Obituary, Dr. Francis D. Merchant, 32

Obituary, Dr. William R. Miller, 32

Pleurisy in Relation to Life Insurance, C. F. Martin, M.D. Discussion by Drs. Bartlett, Gordon, Wilson and Ward, 182

Prudential Longevity Service, William G. Exton, M.D. Discussion by Drs. Muhlberg, Daley and Patton, 244

Report on Progress of the Application of the Cardio-Respiratory Test, Harold M. Frost, M.D. Discussion by Drs. Chapin, Rowley, Blakely and Archibald, 232

Rogers, Oscar H., M.D., Mortality Study of Impaired Lives, 43

Selection of Medical Examiners for Life Insurance, William Muhlberg, M.D. Discussion by Drs. Weisse, Turner, Fisher and Strathy, 260